American Machinist

JUNE 2, 1958 75¢

TWO NEW FORMING METHODS:

Hot sizing p 86
Form and roll die p 89

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

it's mainly a matter of TIMING!

But WHEN to replace a machine depends on more than its age

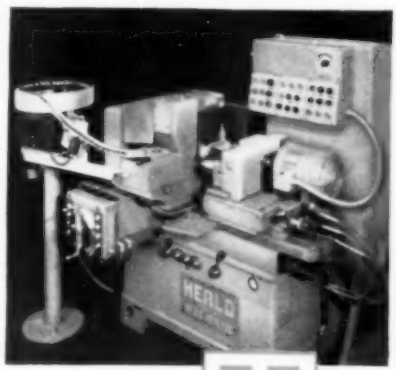
YEARS ALONE don't tell you when a machine has reached retirement age. In fact the age of a machine may be a relatively minor factor in computing the time at which it should be replaced. Some old machines may still have many years of economically productive life. While more recent ones, of a different type, may have already outlived their profitability in your plant.

It depends on many variable factors—including the comparative efficiency of the proposed new machine, and any design improvements which will become available in the foreseeable future. But whatever the replacement conditions, proper timing can mean the difference between *profit* and *loss*. Too early is just as bad as too late. But there is *one* mathematically predictable time when replacement will cost you the least amount of money. This replacement minimum can't be determined by guesswork, intuition, or rule-of-thumb. It requires precise methods of replacement analysis, based on proved economic principles.

Our sales engineers are well experienced in making such obsolescence studies. And they will be glad to do the same for you. Similar studies by Heald engineers have pointed the way to many important *savings*.

For Example: A manufacturer of automotive parts was using two ten-year-old Heald Model 81 Centerless Internals for grinding a blind hole in steel bushings. A cost analysis showed that two new Heald Model 180 Centerless Internals, like that shown at the right, could do the *same job* at a saving of more than 66% in total operating cost. The replacement of the two old machines with two new ones resulted in the production and cost savings shown below.

	2 Old Machines	2 New Machines
Parts per hour	276	426
Parts per year (Req'd. Prod.)	552,000	552,000
Direct Labor, per year	$ 7,252	$ 3,746
Scrap Losses, per year	$ 4,182	$ 705
Annual Maintenance	$ 2,752	$ 250
Annual Operating Cost	$14,186	$ 4,701
Annual Saving for New Machines		**$9,485**



YOU pay for obsolescence. Replacement pays for itself!

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

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American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

TRENDS

Spot News . . 65
Washington . . 67
Detroit . . 69
Aircraft and Missiles . . 71
Machine Tools . . 73
Materials . . 75
What's Ahead . . 77
News Report . . 83
Field Report . . 138

Departments . . .

Letters . . 58
Editorial . . 81
Practical Ideas . . 114
Talking Shop . . 113
Memos . . 113
New Equipment . . 117
Names . . 147

contents for June 2, 1958

VOLUME 102, NO. 11

Cooperative program seeks optimum machining . . . Seventeen companies cooperate in a laboratory to study parts produced by bar automatics and to determine the conditions that will give the minimum cost per piece. **83**

Hot Sizing—hottest way yet to precision form titanium? . . . Bench checking is virtually eliminated and tool costs slashed by new method. *By George H De Groat.* **86**

Pinch and roll dies halve blade cost . . . New method of making small compressor blades hinges on a revolutionary press die combining forming and rolling. **89**

Wanted: An hour for lunch . . . A strong dissent from the standard blitz lunch. *By William Raisglid.* **97**

Large drop hammer makes better parts . . . 50,000 lb hammer at Park Drop Forge applies closed-die techniques to work formerly cast or forged in open dies. *By George H De Groat.* **98**

Clean-machined graphite for Chalk River . . . Graphite walls for atomic reactor require special machining practice. *By Edward J Kleber, National Carbon Co.* **100**

Carbide chasers open new threading horizons . . . First details and production examples of this new technique. *By William M Stocker, Jr.* **102**

Heat-treat dominates gear-tire output . . . Heat treat is critical in forging and machining large steel rings for marine propulsion gears. **104**

REFERENCE BOOK SHEETS

Tests for soluble oils I, II, III . . . Simple tests to check oils under shop conditions. *By Alan B Myler, Sun Oil Co.* **107**

American Machinist chips

Gear Bands . . . The 20-ft, 125-hp vertical boring and turning mill on our cover is one of 17 at Bethlehem Steel Co. It can handle heavy forgings or castings up to 20 ft in diameter and 11½ ft high. The band being machined is for the reduction gearing of a large marine turbine. For further details on the heat treating of these bands see the article on page 104.

That pencil . . . Speaking of covers, we evidently caused consternation from coast-to-coast with the special cover for our Tool Show Issue. We were inundated with telephone calls, letters, and personal comments, most of them fairly violent (see our letters column for samples), about the realism of that cover. Joe Poznanski, our Art Director, designed the cover. The secret of the realism lay in the use of four-color printing to reproduce the pencil on a cover that looked like it was not done in full color. If you reached for the pencil, too, you are a member of the club and we hope you're not too mad at us.

Hot and Cold . . . Better parts, with less bench work, and at 13 times the speed—that's the record of the hot sizing process developed at North American. You'll find the details in the article on page 86. Following this is news of a new process to roll compressor blades that has cut the cost in half. Key is a die that first pinches, then rolls. Developed by three manufacturing specialists in GE's Small Aircraft Engine Dept, the new die has interesting possibilities for many rolling operations. You'll find the process described in full, starting on page 89.

Other Last Minute News . . . This is one of those issues that was completely revamped after this page should have gone to press. We quickly revised it to tell you about the stories above and to mention the following: A cooperative machining program to update the information on machining with bar automatics, page 83. A report on the Russian machine tools being shown at the Brussels Fair, page 92.

Coming . . . *AM* for June 16 tells about an unusual machine that combines broaching and milling. You'll also find articles on cold extrusion, machining honeycomb, brazing, welding, and linear programming.

Cover . . .

Gear bands are machined on a Niles boring mill in this dramatic photograph taken at Bethlehem Steel. See details at left.

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American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index. American Machinist publishes its own annual index; this is available on request to the editor.

American Machinist, published bi-weekly, with an additional issue in mid-September, by McGraw-Hill Publishing Company, Inc, James H McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, CIRCULATION, ADVERTISING and PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd St, New York 36, NY. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Subscriptions are solicited only from production executives and engineers in the metal-working industries. **Position and company connection must be indicated on subscription orders.**

Postmaster: Please send form 3579 to American Machinist, 330 West 42nd St, New York 36, NY

United States subscription rate for individuals in the field of the publication $5.00 per year, single copies 75 cents, foreign $25.00 per year, payable in advance. Second-class mail privileges authorized at New York, NY. Printed in USA. Title registered in U S Patent Office.

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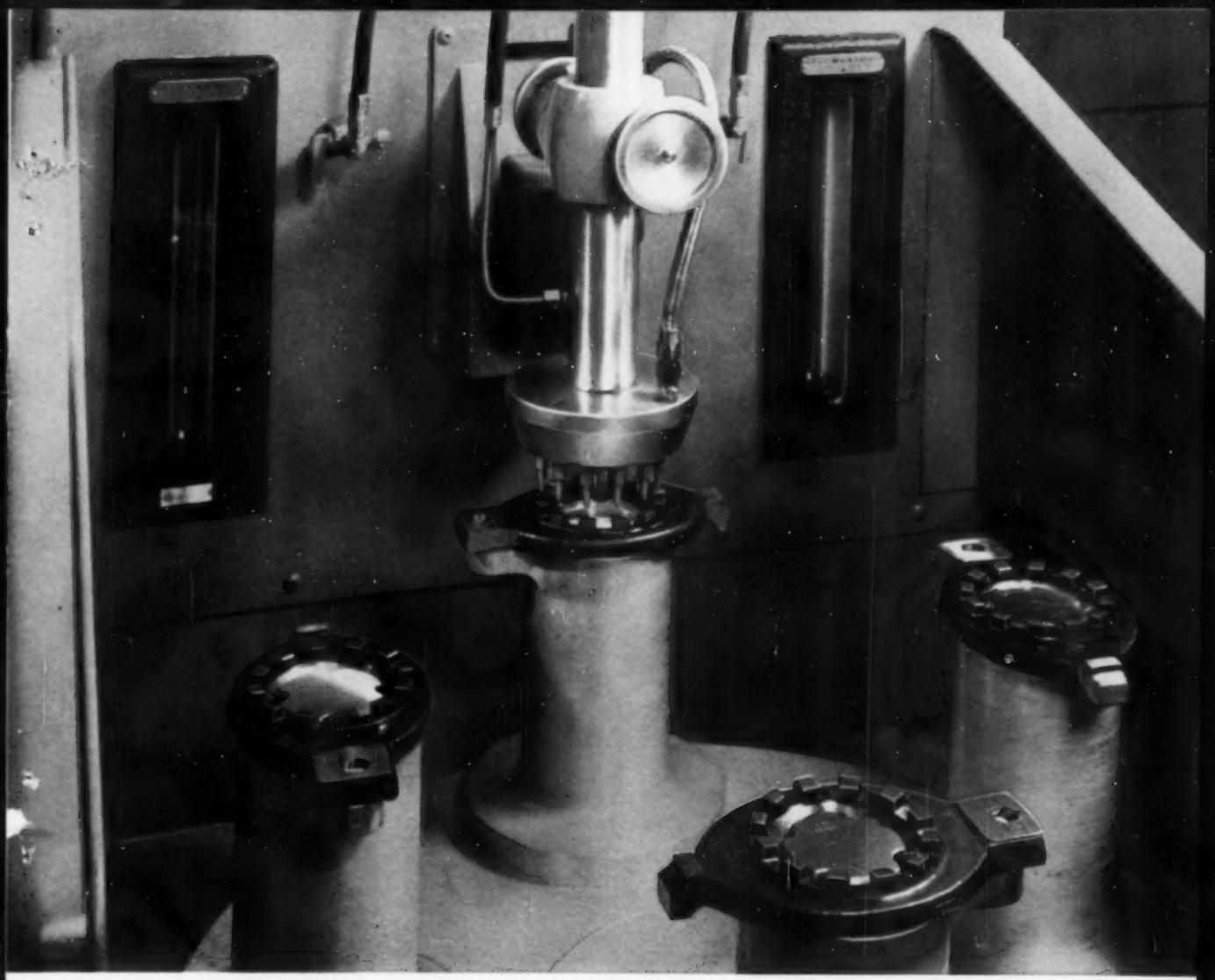


Now...*controlled hardening* of wearing surfaces

With these new Gleason machines you can make metal surfaces on couplings, splines, and other parts more wear-resistant by surface hardening.

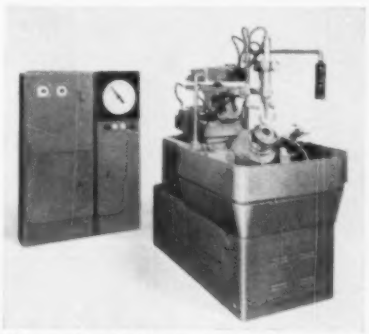
In the setup shown, the machine heats all twelve teeth of a coupling at once with a twelve-tip oxyacetylene burner. Indexing of work to the burners is automatically controlled.

A cam-controlled burner motion provides an oscillating movement of the burner tips to assure uniform penetration of the heating. This oscillating action in conjunction with electric timers controls the depth of hardness.

There is no measurable distortion because only the coupling teeth are heated and each tooth is heated uniformly on both sides, and the hardness is limited to the wearing surfaces. The life of the part is greatly increased.

You can set up the machine for small as well as volume production of parts up to 12″ diameter. Both ways, the machine is completely automatic except for loading.

This is one of a series of Gleason machines for hardening metal parts including bevel and hypoid gears and spur and helical gears. For additional information write for our bulletin. *Complete coupling is surface-hardened* in a single pass on the Gleason No. 108 Surface Hardening Machine.

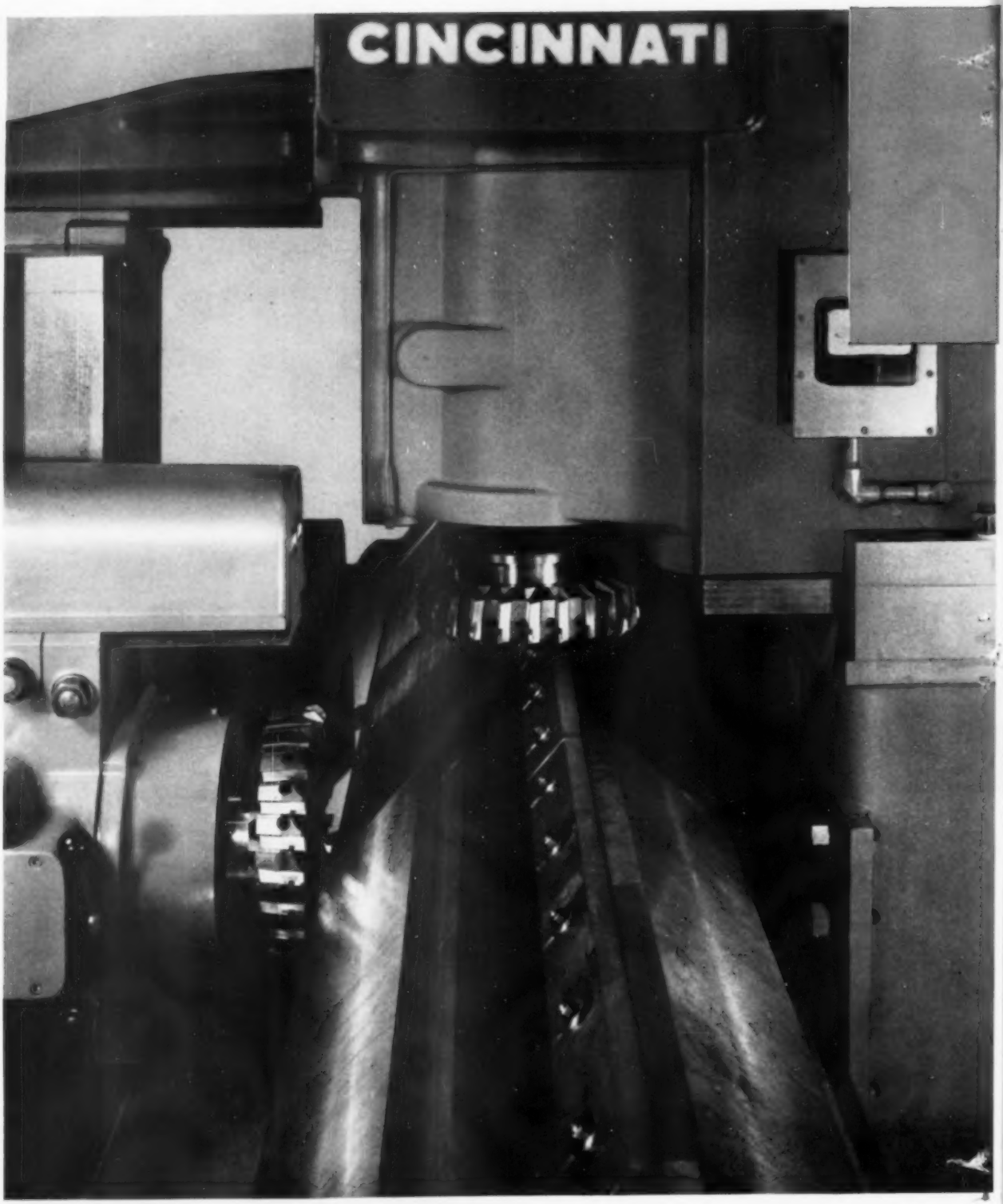


Gleason No. 1 Gear Surface Hardener with electronic control unit. Accommodates bevel gears up to 24″ pitch diameter, spur and helical gears up to 30″, internal gears up to 24″ outside diameter.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.



CINCINNATI®

Special Machine Tools · Vertical and Horizontal

HyPowermatic

with Two 50 hp Spindles

Mills Several Surfaces of Long Steel Parts

Unusual requirements are commonplace conditions for Cincinnati's Special Machine Tool Division. A manufacturer of a variety of long steel knives, blades and similar parts wanted a machine having the versatility to mill the entire range of these parts, and in addition, rapid rates of metal removal were required. Cincinnati Engineering Service Specialists, using the extensive standard HyPowermatic® line as a basis, developed the special HyPowermatic Milling Machine illustrated here. Excellence of performance may be judged from the following specification highlights:

50 hp motor drive for each spindle . . . table feeds 1/4 to 100 ipm . . . spindle speeds 20 to 800 rpm . . . rapid table traverse 200 ipm . . . 168" table travel . . . automatic quill retraction . . . high pressure flushing system for continuous removal of chips

For all milling operations, the work is held on a universal magnetic chuck, energized prior to the table traverse, and equipped with power angular positioning. This machine is typical of single units of production equipment built by the Special Machine Tool Division. Other types of equipment range up to complete production lines. May we show you what we can do to solve your metal-working production problems and their related handling chores? Our Engineering Service team wants to hear from you.

Straddle milling operations, too! The setup illustrated above shows how it's done.

CINCINNATI® Special 100 hp HyPowermatic Milling Machine removes metal in a torrent or a light flurry, as required by the part being milled.

CINCINNATI

Broaching Machines · Complete Production Lines

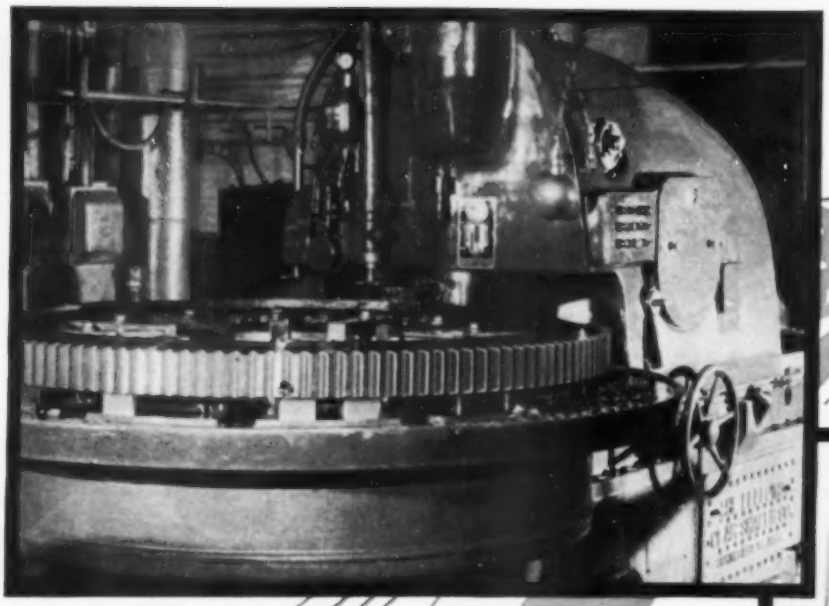
Special Machine Tool Division

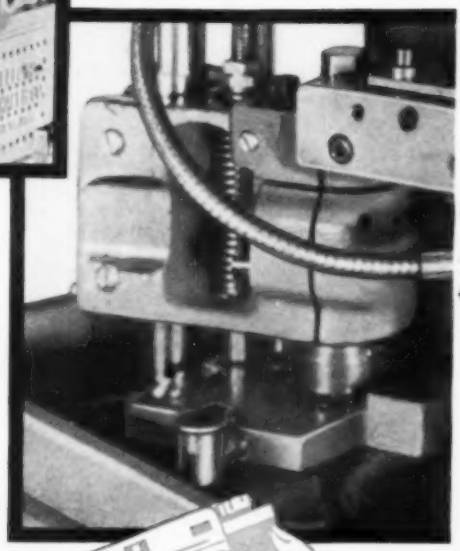
THE CINCINNATI MILLING MACHINE CO.

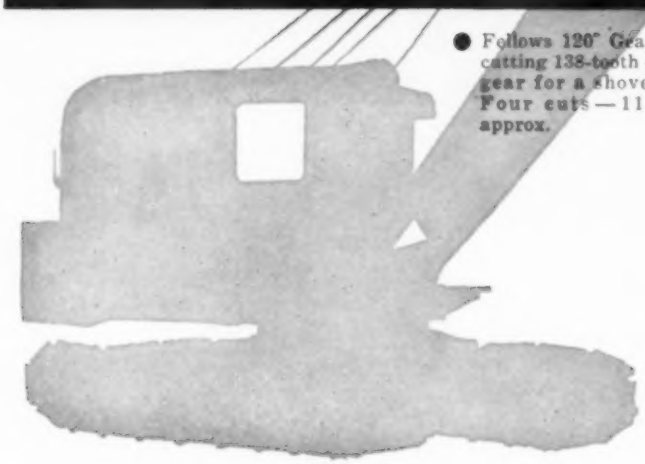
CINCINNATI 9, OHIO

GEARS to Turn a Giant

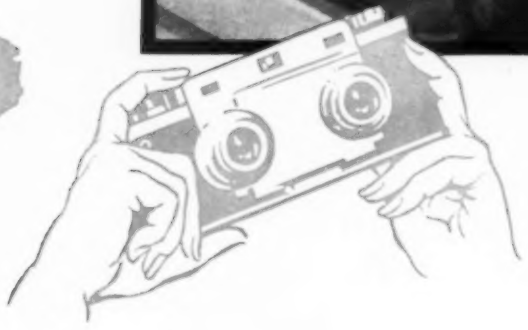
...or







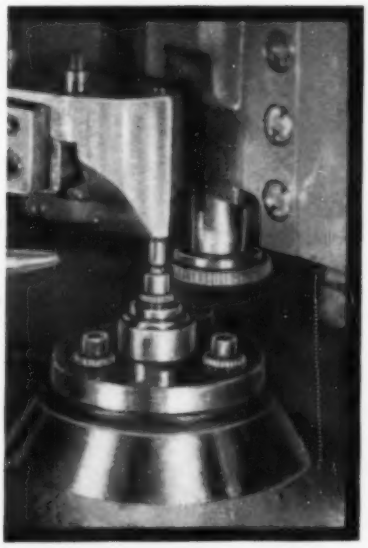
● Follows 120° Gear Shaper cutting 138-tooth cast steel gear for a shovel-crane. Four cuts — 1181 min. approx.



THE PRECISION LINE

Shovel
Adjust a Small Camera

For any size gear in the range, new Fellows Gear Shapers lower costs because of their versatility, fast set-up and production speed.



● Fellows 3" Fine-Pitch Gear Shaper cutting 27-tooth, 0.4219" P.D. steel camera gear. One cut—35 seconds, floor to floor.

Whatever capacity you need, from 1/16" to 120" P.D. there's a Fellows Gear Shaper that will pay dividends in lowered production costs. In many plants, new Fellows machines have cut unit costs by more than a third and repaid the original investment in a very few years.

In every size range, new Gear Shapers speed set-ups and change-overs, increase production flexibility as well as cutting speeds and feeds. Rigid construction makes it possible to hold close tolerances on internal and external spurs, helicals and herringbones, as well as on an almost unlimited variety of cams, splines and other non-involute shapes.

Your Fellows Representative can *show* you in your plant where you can cut production costs with newer machines. Ask him today. Simply write, wire, or phone any Fellows office.

THE FELLOW GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

Fellows *Gear Production Equipment*

No matter how many cutting tools the "whole package" is available

MORSE-FRANCHISED

Take a close look at this set-up and you'll see these 7 tools: Center drill, cobalt drill, carbide core drill, facing and turning tool, roughing reamer, finishing reamer, tap.

One man supplied all seven tools. And he, of course, is the Morse-Franchised Distributor . . . the only source for all the varied requirements of a complete tooling job like this. And the job is protected . . . *results insured* . . . by Morse Quality in every single tool. How are *your* cutting tool sales . . . the *most?*

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASS.
Subsidiary of VAN NORMAN INDUSTRIES, INC.
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE
means
"THE MOST"
in Cutting Tools

in a set-up . . .
from the
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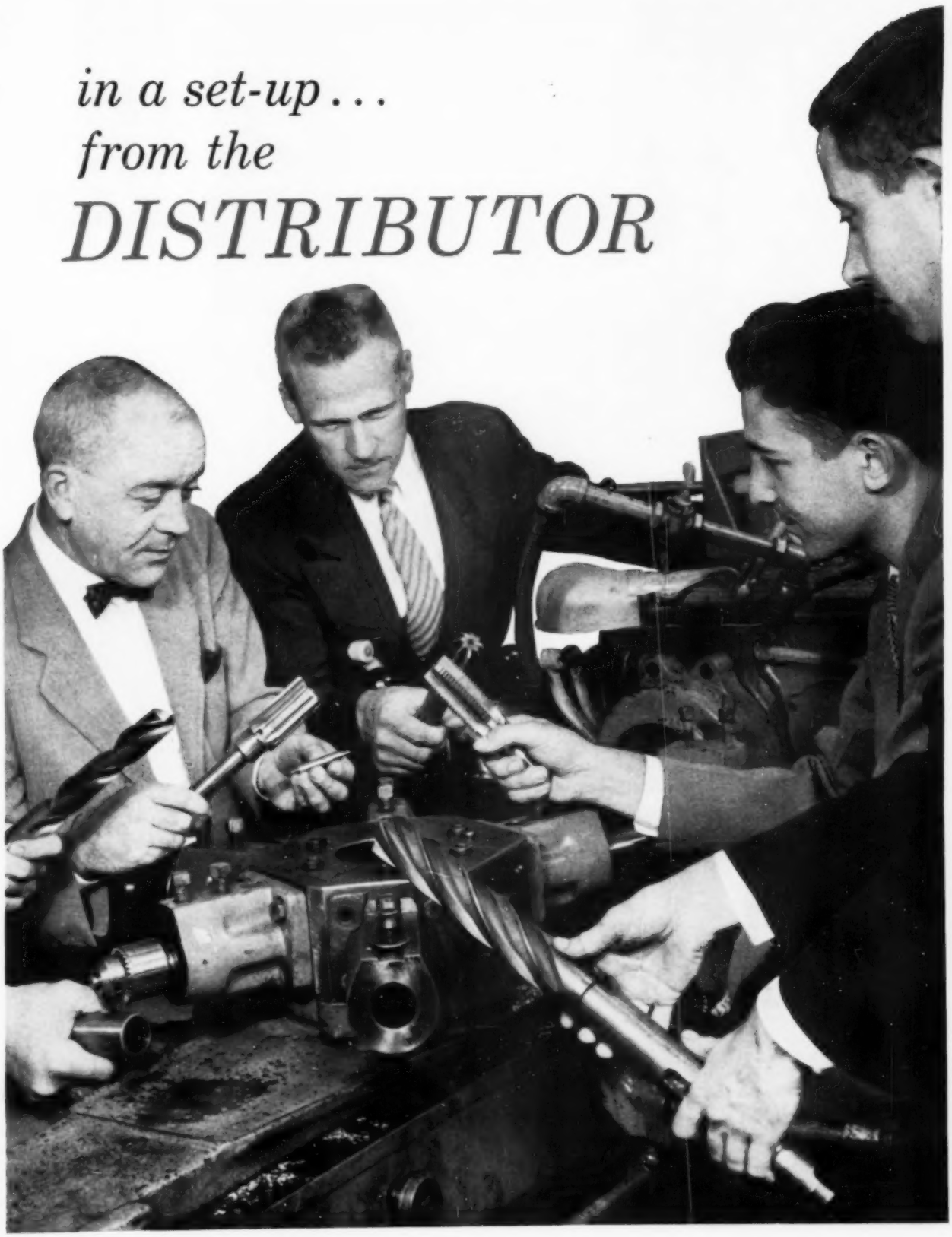

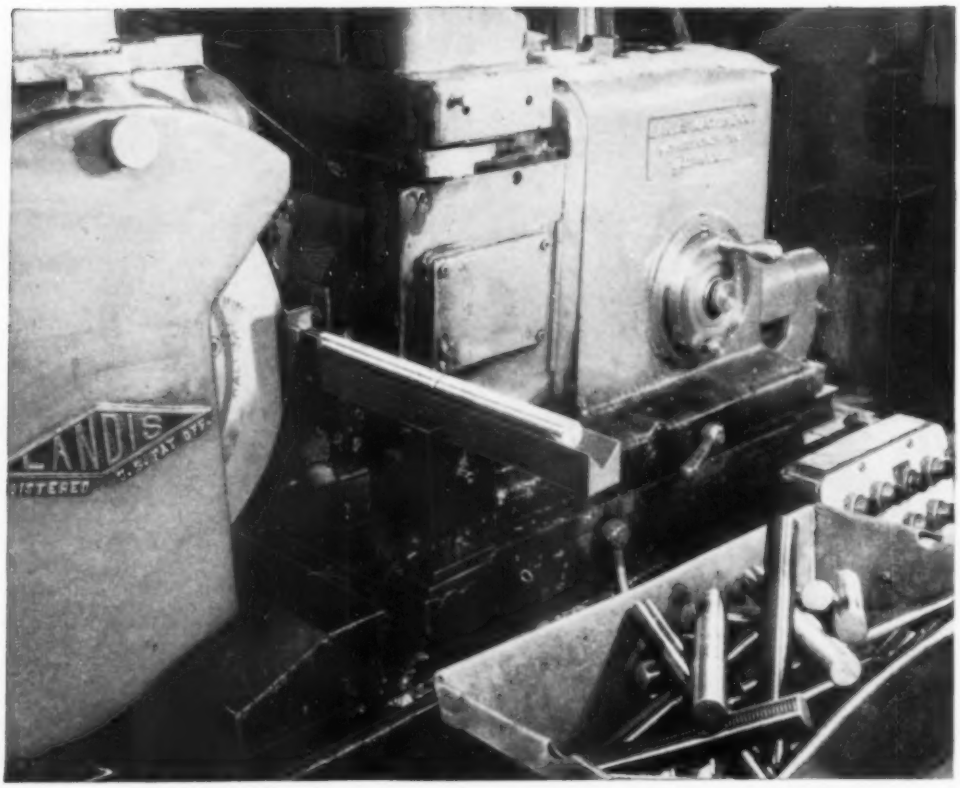

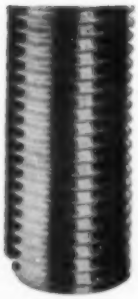

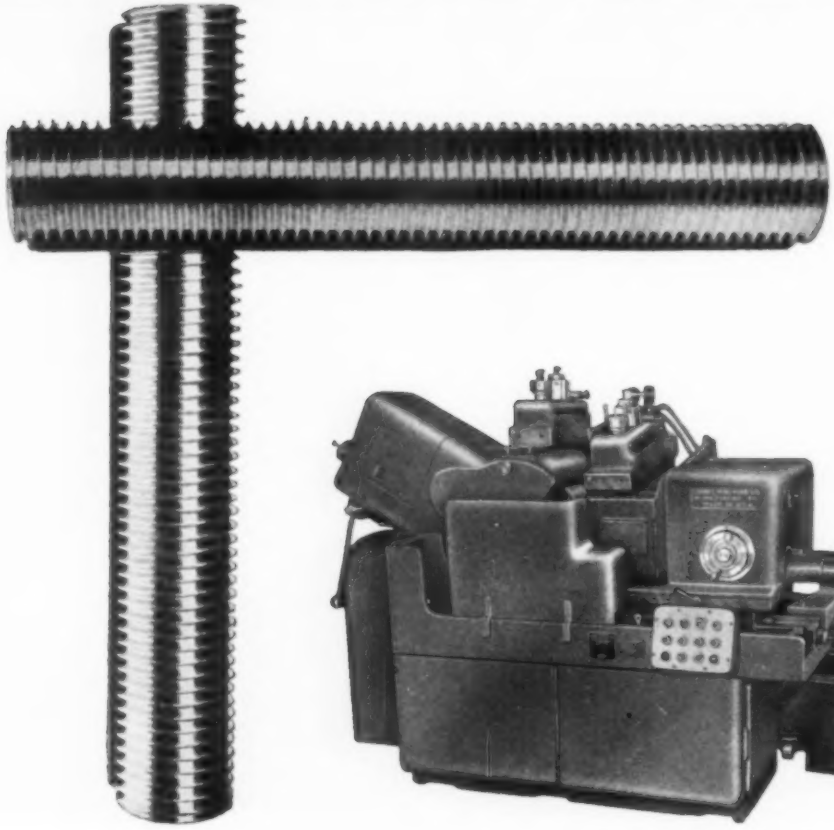

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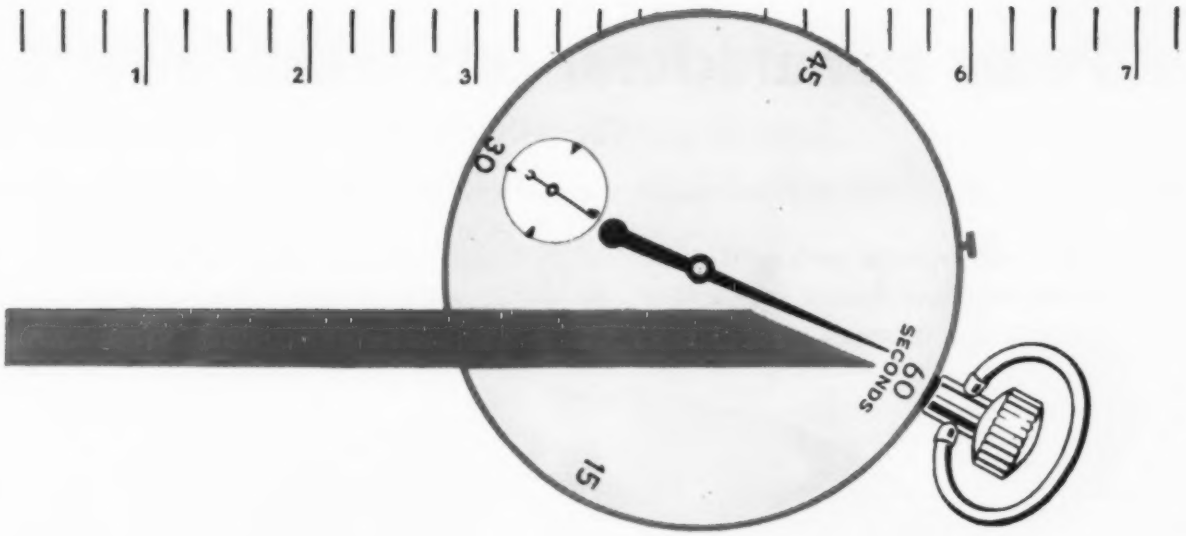


Threads 7¼" per Minute by CONTINUOUS GRINDING

LANDIS Centerless Thread Grinders are being used at the Kilbourn Engineering Company in Milwaukee, Wisconsin, to produce continuous threaded studs for high-pressure high-temperature service.

Studs ranging from ⅝" to 1⅜" in diameter are threaded from blanks of SAE 4140 steel heat-treated to a 260-320 Brinell hardness. In the operations illustrated, 1⅛" 8 pitch UN threads must be generated 10" long to a Class 7 fit to meet ASA standards (Manual B1.4). These threads are produced with LANDIS #1 Centerless Thread Grinders by continuous thru-feed grinding at the rate of 7¼ linear inches per minute, **or better.** The excellent quality and smooth finish of the ground thread has reduced final assembly time and minimized galling.

Centerless Thread Grinders, manufactured exclusively by LANDIS, are designed for the high-speed threading of a wide variety of workpieces from 1/16" to 4¾" in diameter. Blanks having one or more diameters, requiring threads on the outer diameter, can be threaded automatically by the thru-feed process used here.

Centerless Thread Grinding, by utilizing the "up-grinding" technique, is also well-adapted for threading workpieces of high hardness and coarse pitch. This process allows up to 30% higher work surface speeds, and often eliminates secondary threading passes required by other methods. For further information, send specifications and ask for Bulletin E-97.

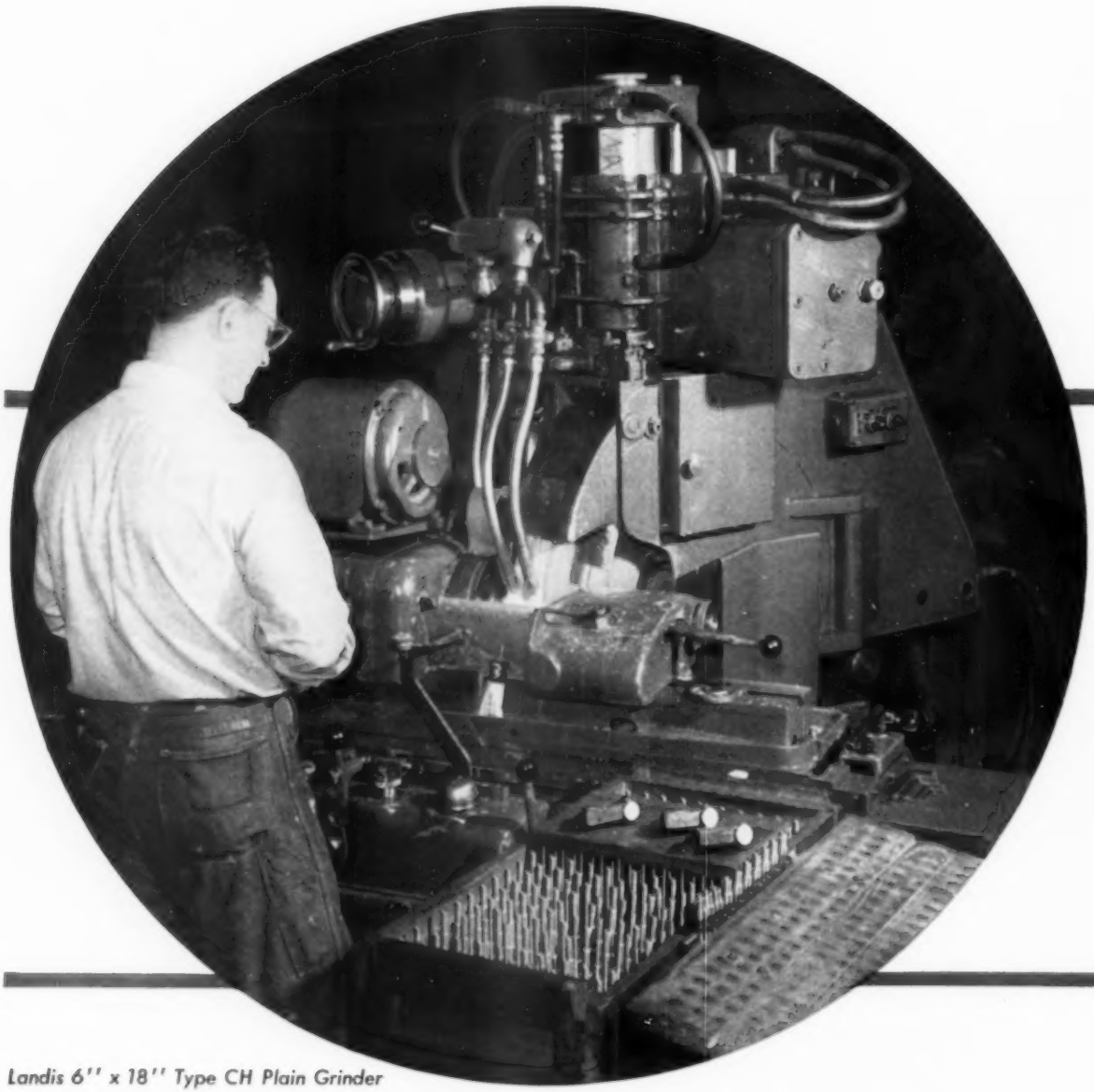
LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Pump manufacturer cuts grinding cycle

. . . Landis grinder with angular wheel head grinds

- **One control starts work rotating, coolant flow, and advances wheel head**
- **Profiled wheel dressed automatically without breaking setup**
- **Grinds to a tolerance of .0003" on diameter**

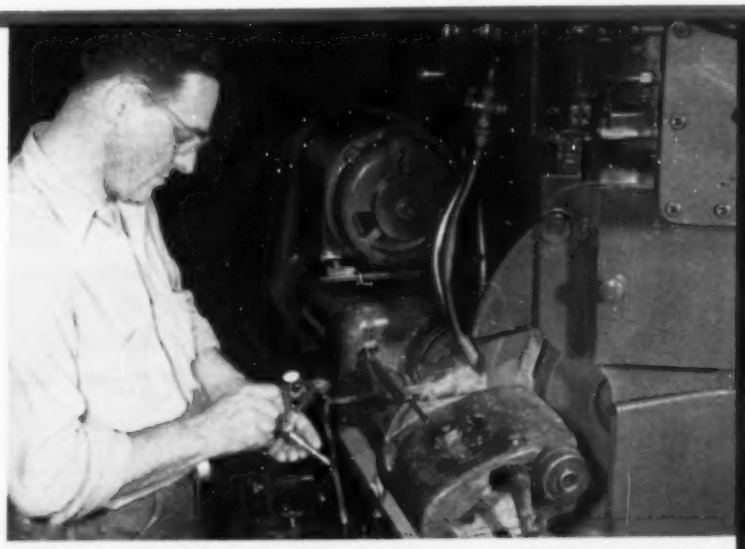


Landis 6" x 18" Type CH Plain Grinder with angular wheel head and overhead dresser

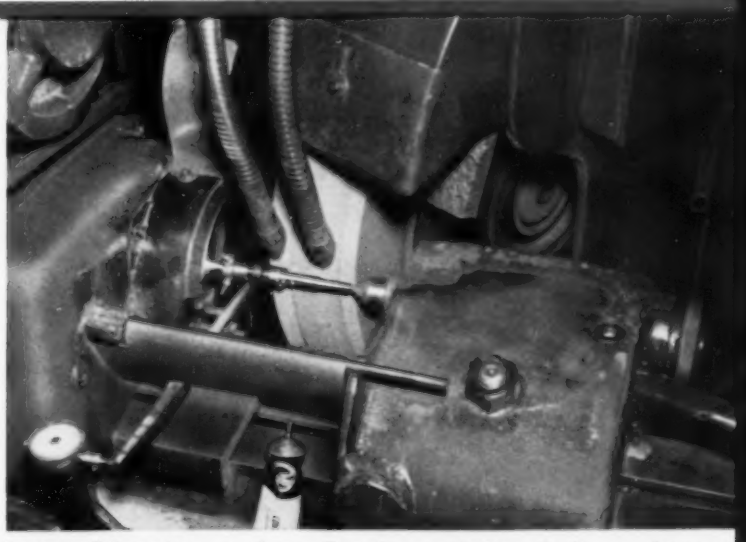
LANDIS TOOL COMPANY

# of multi-diameter shaft by 80%

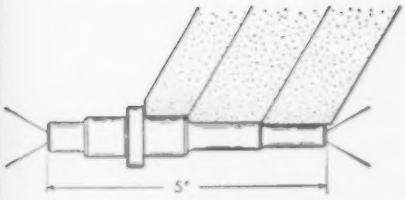
3 diameters and face in one operation



Spot checks of workpiece for size and finish made while another piece is being ground.



Lateral locator used to align the workpiece before advancing the wheel.



production data

Machine:	Landis 6"x 18" Type CH Plain Grinder with 30° angular wheel head
Part:	Multi-diameter pump shaft
Operation:	Infeed grinding 3 diameters and adjacent face at one time
Cycle time:	20-22 seconds, including handling
Material:	C-1144
Hardness:	65 Rockwell C
Stock removal:	.010"-.015"
Finish:	10-20 Micro-inch
Tolerance:	.0003" on the bearing diameter

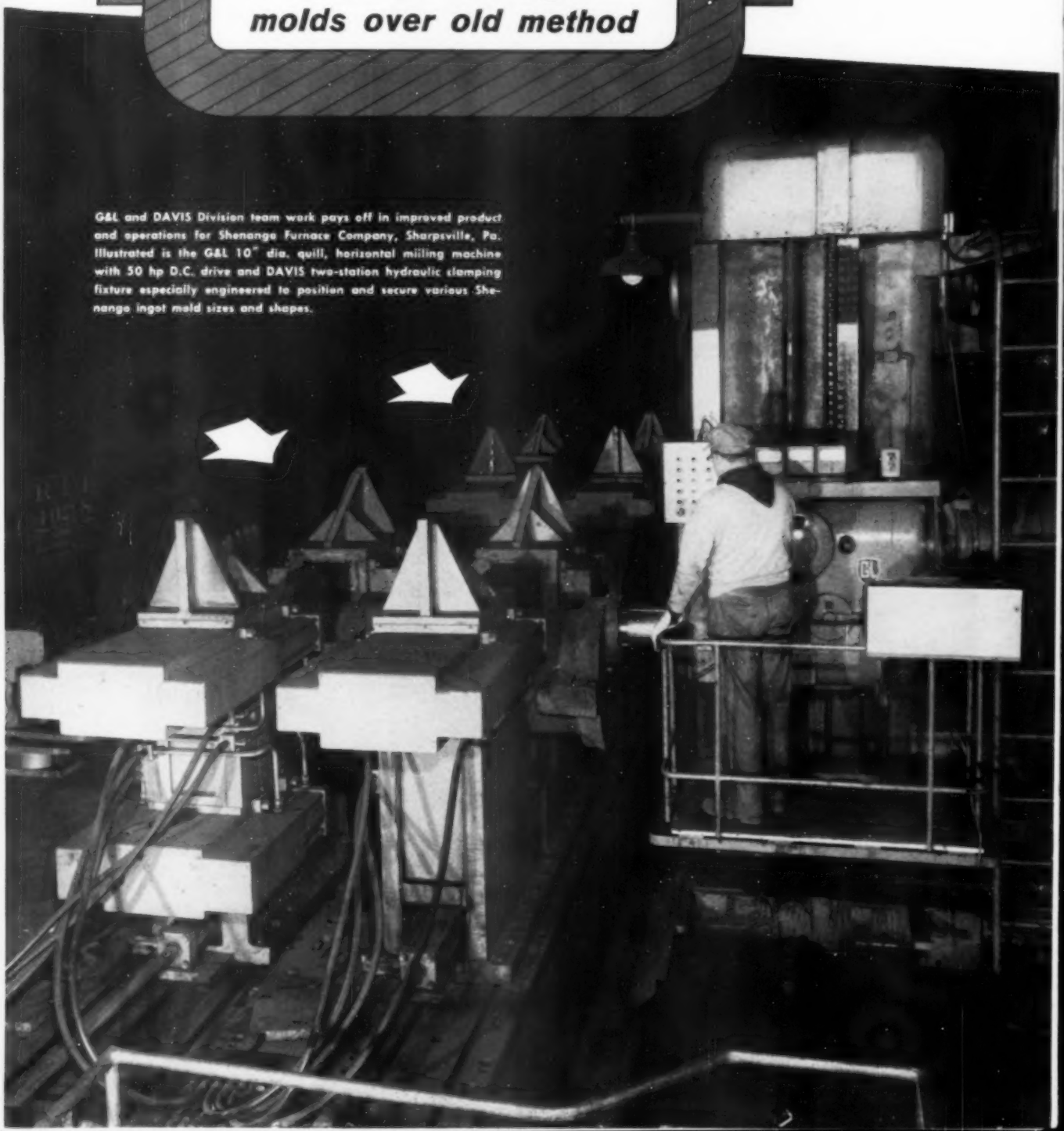
WAYNESBORO, PENNSYLVANIA

LANDIS

precision grinders

Success story at The

Cuts machining time 85% on ingot molds over old method



G&L and DAVIS Division team work pays off in improved product and operations for Shenango Furnace Company, Sharpsville, Pa. Illustrated is the G&L 10" dia. quill, horizontal milling machine with 50 hp D.C. drive and DAVIS two-station hydraulic clamping fixture especially engineered to position and secure various Shenango ingot mold sizes and shapes.

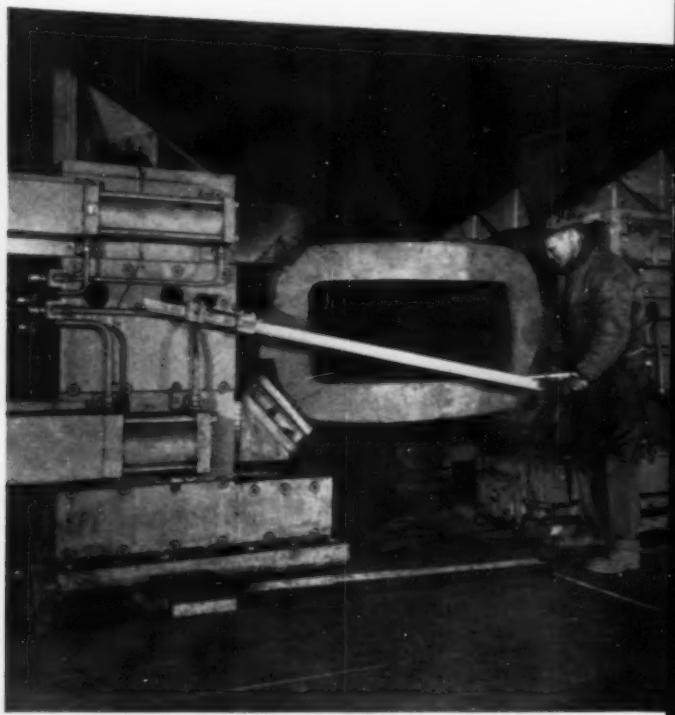
Shenango Furnace Company

New G&L 50 hp Floor-Type Mill removes more than 150 cu. in. of cast iron per minute on all Shenango molds—time averages 1/8 of former time required!

Combined Giddings & Lewis and DAVIS Division machining and engineering talent . . . plus unique manufacturing skills . . . made this project an outstanding success.

For example, a mold with base dimensions of 43" x 91" now takes only 1½ hours machining — formerly required 8 hours!

You, too, can put the same type of creative design and production talent and application engineering to work on your problems. For consulting help and recommendations on all types of machining, or further details on this G&L floor-type mill, call your nearest Giddings & Lewis representative or write direct. State your problem — if possible, include work prints.



Two DAVIS matched sets of rugged hydraulic fixture clamps permit rapid loading, milling and unloading. While machining operations are performed, setup of another mold is made at adjacent station. Fixture features 10" square hydraulic rams with 12" wide serrated jaws exerting 1,200 psi clamping pressure.

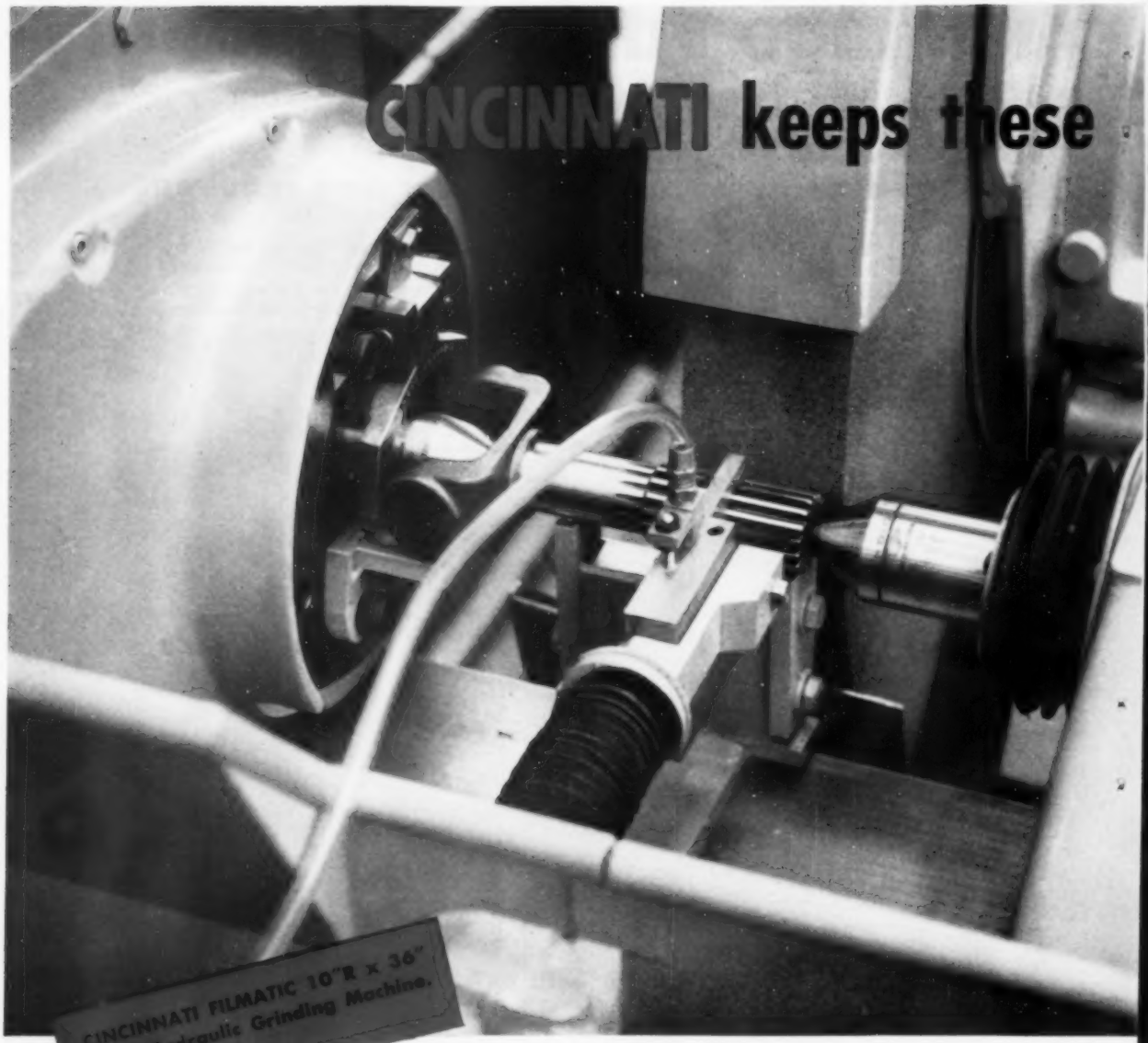
Note G&L machine's metal hogging ability demonstrated on this plug bottom mold. Overall machine power and rigidity permit the carbide cutter to make heavy cuts through rough surfaces — bring mold ends to necessary flatness in record time.

G & L *and* HYPRO DIVISION
GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN G-92

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines—table, floor and planer types; HYPRO Double-Housing and Openside Planers; Planer-Type Milling Machines; Vertical Boring Mills; Spar and Skin Milling Machines and VARIAX Profile Milling Machines.

G-92

CINCINNATI keeps these



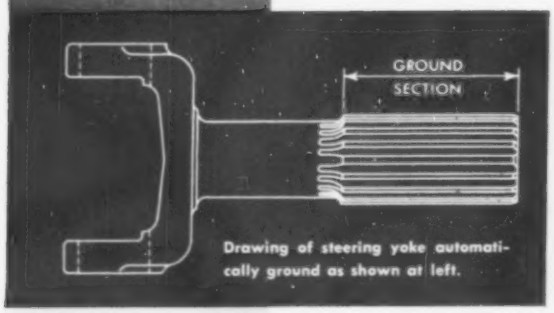
Horizontally mounted Air-Electric Gage Sizing Equipment, on CINCINNATI FILMATIC 10"R Plain Grinder, keeps size and production under control. Operation performed—grinding spline section of automotive steering yokes.

FILMATIC

CINCINNATI®

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING
ROLL GRINDING MACHINES • SURFACE GRINDING MACHINES •

tough grinding jobs under control



Drawing of steering yoke automatically ground as shown at left.

Cycle Time Stabilizer automatically compensates for wheel wear

Spline sections and other cutaway diameters are tough on grinding wheels. Ordinarily, frequent adjustments for size and/or length of infeed cycle are required. Cincinnati cures these ills of rapid wheel wear with Automatic Air-Electric Gage Sizing. An exclusive extra advantage of this equipment, *Cycle Time Stabilizer*, does the trick. It automatically adjusts the length of infeed cycle to compensate for wheel wear and truing. Cycle time cannot increase; rate of production cannot decrease. ¶A horizontally mounted variation of Automatic Air-Electric Gage Sizing is incorporated in the CINCINNATI FILMATIC 10"R Plain Grinder abbreviated in the illustration at the left. This machine does an excellent job of grinding the spline diameters of steering yokes. Other automatic features which help to keep the cost of production at a minimum include:

Push-button Automatic Dual Rate Infeed
Behind-the-wheel Truing with Cycle Counter
Automatic Positioning of Headstock Spindle
Gap Eliminator
Flat top table, work cradles, and hydraulic footstock

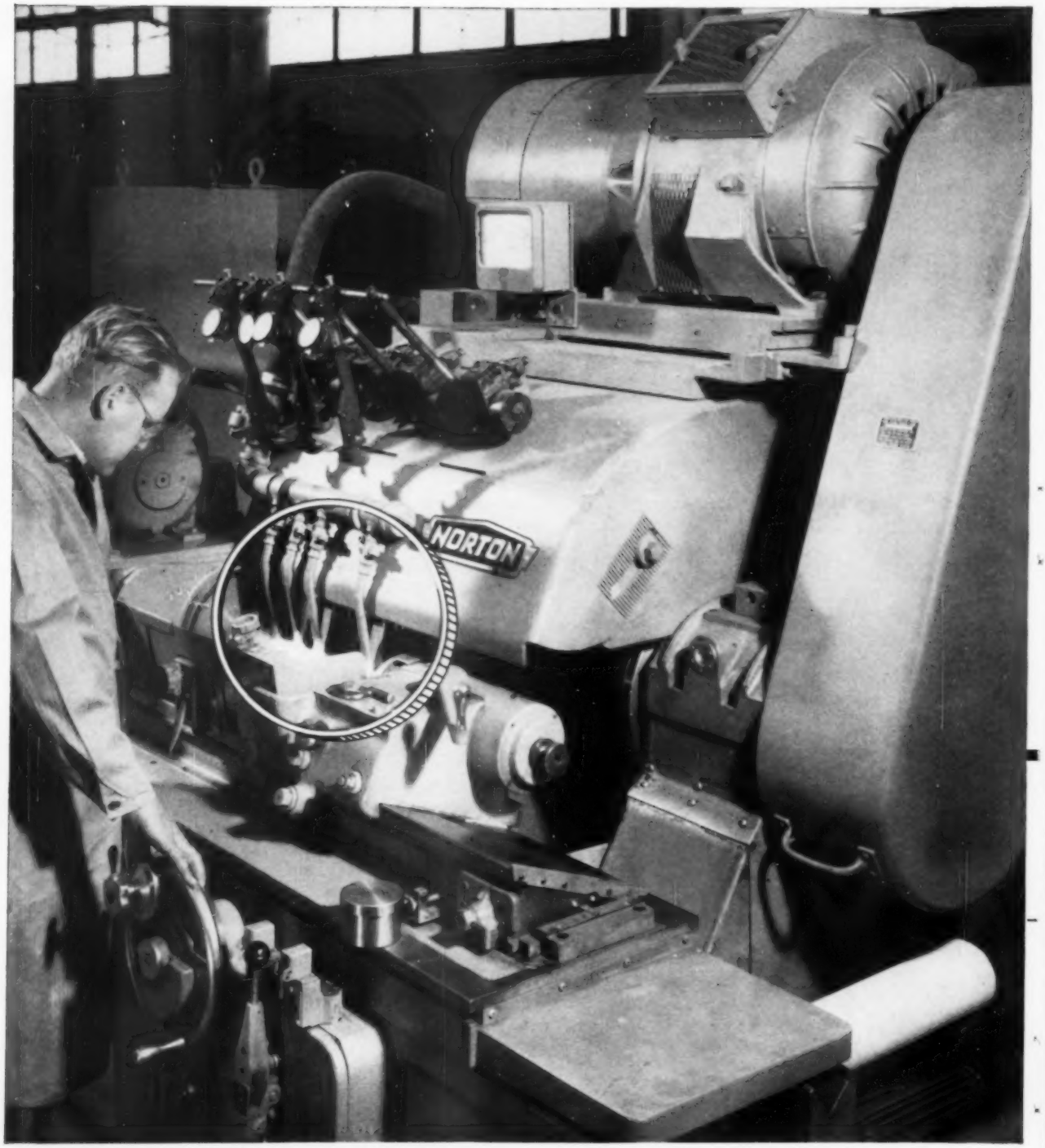
Of course, standard machine features contribute importantly to the way in which Cincinnati keeps tough grinding jobs under control. FILMATIC bearings, for example, easily withstand heavy loads, shock loads, or any load imposed by the grinding wheel. Other advantages offered by Cincinnati include imaginative engineering service and a selection of over 160 sizes, types and styles of precision grinding machines. All are good medicine for your machine tool replacement or additional equipment program. Complete information on the standard 10"R Plain Grinder may be obtained by writing for catalog No. G-661-1. Sweet's Machine Tool File contains brief specs.

CINCINNATI

MACHINES • MICRO-CENTRIC GRINDING MACHINES
CHUCKING GRINDERS • CENTERLESS LAPPING MACHINES

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

Grinding multi-diameter parts



Replacing Four Separate Grinders, a Norton CM-1 grinds four diameters simultaneously — in a fraction of the time it used to take to finish this job. A great new production tool, the Heavy Duty Multi-Wheel CM-1 can perform even more grinding operations at once — on crank and camshafts, transmission and motor shafts and other multi-diameter parts. The machine has also been arranged for grinding pin diameters in multiple on crankshafts with pins lying in the same plane. And power-assist loading mechanism is available for many applications.

this fast, easy, accurate way...

cuts operating time and costs

Norton Type CM-1 Multi-Wheel Grinder reduces your operating expenses and capital investment by completing several jobs at once

You can get one grinding machine that does the work of several, in a fraction of the working time — bringing you considerable savings on purchase costs, operating costs and floor space.

That machine is the Norton Type CM-1 Heavy Duty Semiautomatic Multi-Wheel Grinder.

The CM-1 makes four or more cuts in a single plunge-grind cycle, operating automatically under one-lever control. And it completes each separate grinding operation with the accurate, trouble-free performance that's built into every Norton grinding machine.

Typical Advanced Features

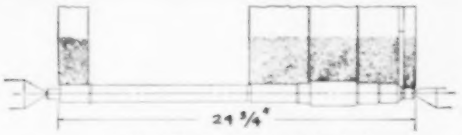
- Cartridge type bearings at each end of heavy, 10"-diameter wheel spindle assure extreme rigidity of spindle, longer wheel life, greater accuracy and control with minimum truing.
- Automatic truing device — in rear, out of operator's way — trues straight or formed wheels each individually, yet all at once, thus requiring only the amount of time needed to true widest wheel.
- Automatic compensation for wheel wear, and amount trued off. No adjustment or resetting of wheel needed after truing.
- Optional equipment includes built-in automatic sludge remover and coolant filter, constant peripheral wheel speed control, automatic work loading and unloading equipment.

Why not get the complete story of how the CM-1 can bring the cost-reducing, profit-boosting "Touch of Gold" to your grinding operations? See your Norton Representative, or write us direct. And remember: only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize, Modernize with **NEW**

NORTON

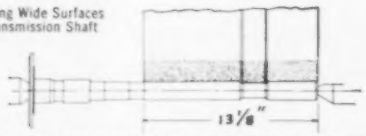
GRINDERS and LAPPERS

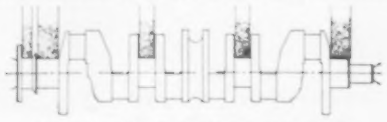


Combining Five Cuts on Transmission Shaft

Plunge Grinding Five Camshaft Bearing Diameters

Grinding Wide Surfaces on Transmission Shaft




Grinding Line-Diameters on Automotive Crankshaft

Versatility that Meets Many Needs. On the CM-1, workpieces can be up to 36" in length. As shown in these four typical diagrams, grinding wheels can be located, close together or far apart, as required. And regardless of the number of wheels in any group, their combined widths — plus spacing collars — can total up to 30", exceeding the widest group shown here. This Norton-engineered versatility brings progress and profits to your diameter grinding — because with the CM-1 you can actually finish a group of line-diameters in approximately the time you've been spending on a single diameter grind.

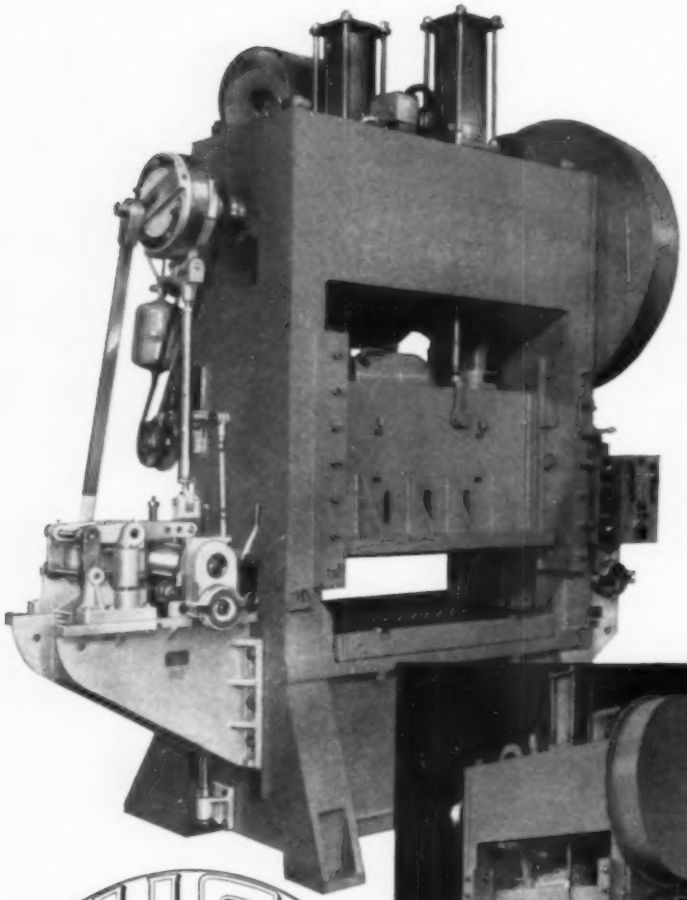
Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

District Offices: Worcester • Hartford • Cleveland • Chicago • Detroit — In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

FOR CONSISTENT PERFORMANCE

U. S. Style "B" Roll Feeds

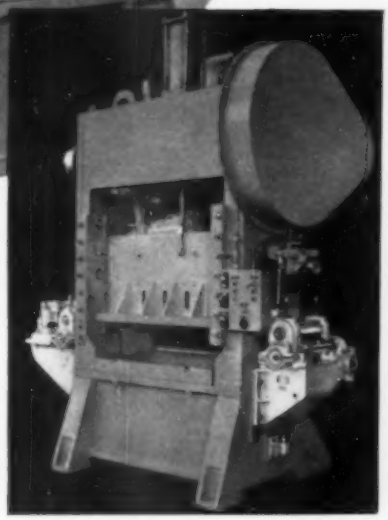


The introduction of U. S. Tool Company Style "B" Roll Feeds brings to your Press-Room a new line of Rack and Pinion Roll Feeds in a range of sizes to keep pace with most production requirements.

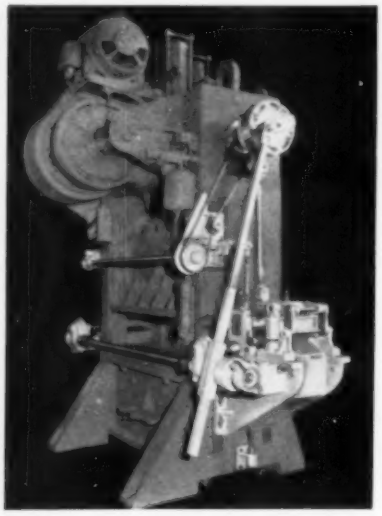
U. S. Style "B" Roll Feeds are made in both double and single types, with bolster plate for O.B.I. presses or with adjustable mounting brackets for straight side presses.

All Style "B" Roll Feeds are equipped with hardened and ground rolls of hollow construction, which are driven by hardened spiral gears running in oil. These gears are mounted in an enclosed housing. The roll-pin type over-running clutch has carbide inserts. Standard equipment also includes manual roll lifters; self-equalizing brakes; two-piece adjustable driving eccentric to simplify timing the feed in relation to the motion of the ram of the press; stock oiler and eccentric operated scrap chopper. Automatic roll lifters are available in either ram operated or adjustable eccentric operated types.

For full information regarding the U. S. Style "B" Roll Feeds write for your copy of Bulletin 85-A.



U. S. Style "B" double Roll Feed Model No. RF-1212, with scrap chopper mounted on a modern straight side press. This particular installation handles stock widths up to 12", with feed length adaptable up to 12".



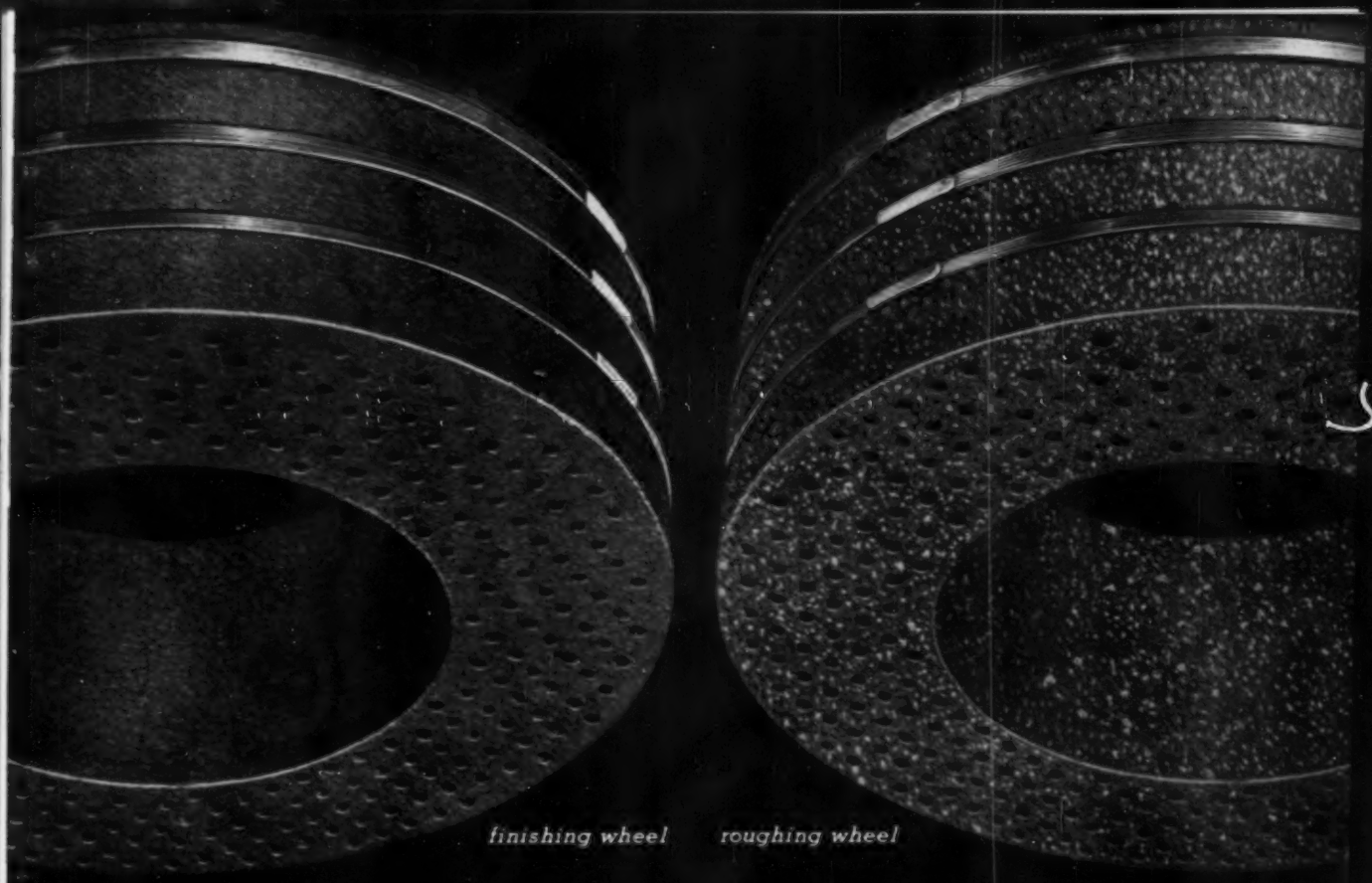
Rear View: Showing the rack and pinion mechanism and cross members for actuating the entering feed and eccentric operated roll lifters. One of 5 models of U. S. Style "B" Roll Feeds will fit your Press Room Eqiupment.

US PRODUCTS

Slide Feeds
Roll Feeds
Stock Straighteners
Stock Reels
Stock Oilers
Coil Cradles
Wire Straighteners
Die Sets
Multi-Slides®
Multi-Millers®

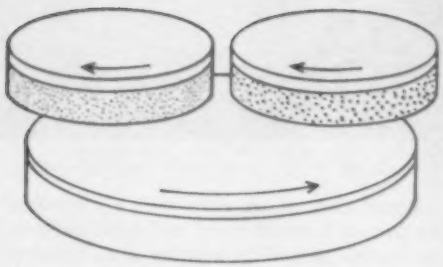
U. S. TOOL COMPANY, INC.

AMPERE *(East Orange)* NEW JERSEY



finishing wheel *roughing wheel*

Gardner abrasives double production in both rough and finish grinding



... greater wheel life due to improved combination of grade and grain

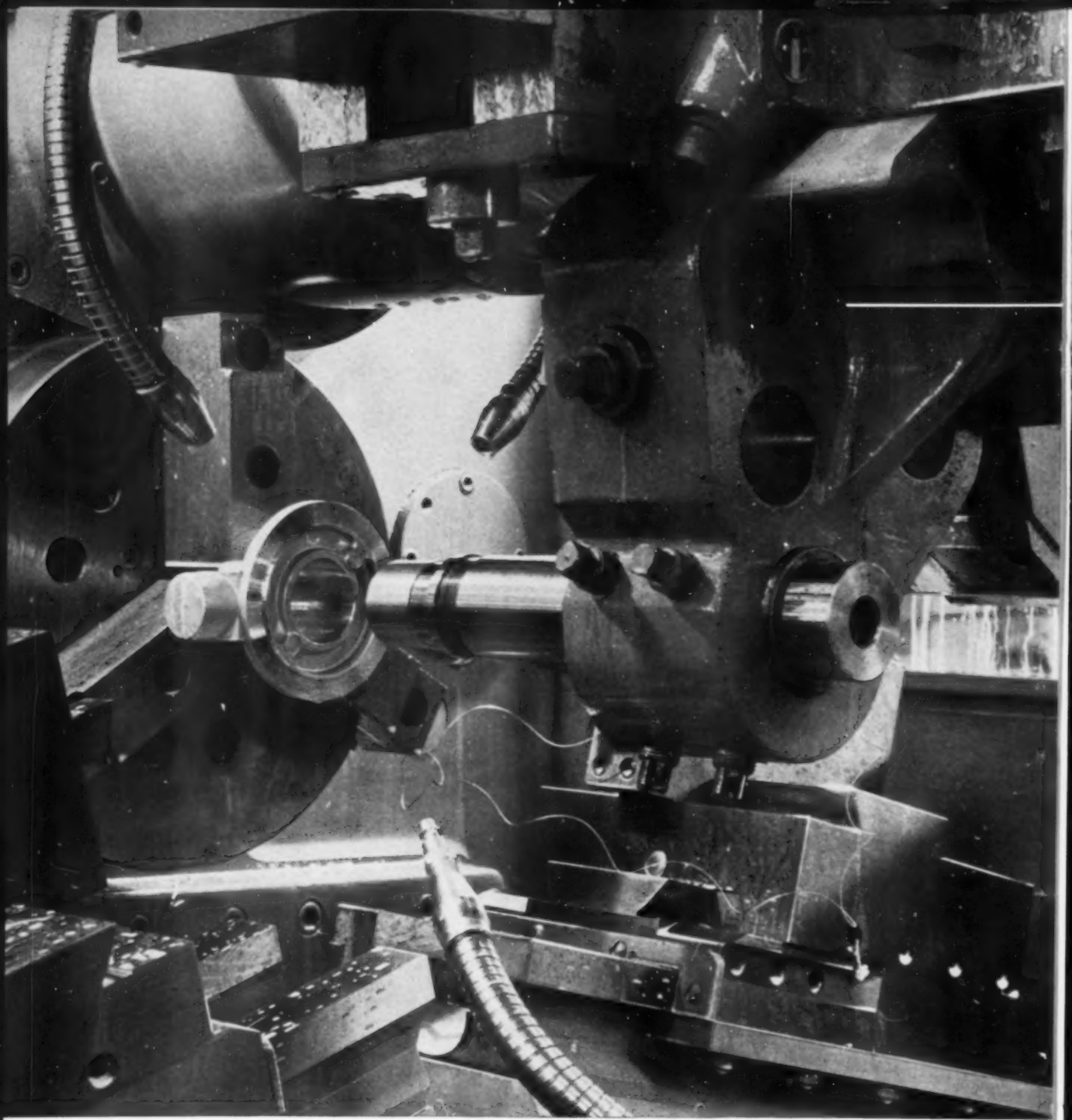
Workpiece	water pump housing
Rough grind	23,000 parts per disc
Finish grind	36,000 parts per disc
Former production	11,400 and 18,100 parts per disc

Specifications for Gardner abrasives are written by men who are thoroughly experienced in both abrasives and grinders . . . Your assurance that your problem can be solved practically, economically.

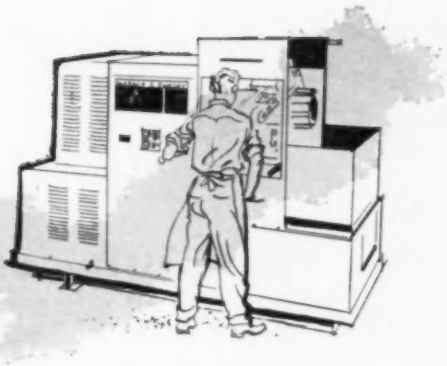
GARDNER

abrasive discs

BELOIT, WISCONSIN



Story behind the story —Installation of an extra switch operating screw in the index drum for "Spindle Stop on Turret Return" and elimination of a speed dog on the bushing assembly station permit the bushing to be inserted automatically. With the spindle stopped, the loading tool comes forward in rapid traverse and presses the bushing home automatically. The simple, yet unique, bushing assembly bar, designed by Thompson's tool engineers, utilizes stacked "Belleville" washers to present sufficient end pressure to seat the bushing—while, at the same time, offering a cushion between final seating of the bushing and the end of the pentagon turret's forward stroke. It assures proper seating of the bushing in addition to providing a safety factor to the turret's operating mechanism.

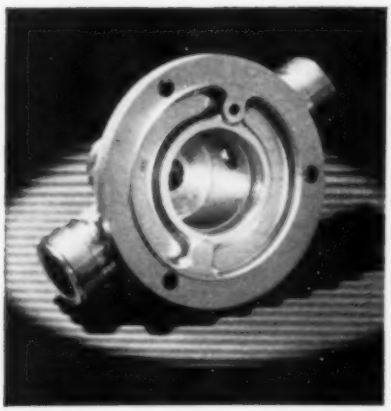


At Thompson Products Inc.

ELECTRONICS DIVISION

Warner & Swasey 2 AC cuts production time two-thirds on this coaxial switch housing

Repetitive accuracy and versatility of their new 2 AC Single Spindle Chucking Automatic enabled the consolidation of three separate operations, with their required setups and part handlings, into only one setup—reducing overall time from 21 to 7 hours per hundred parts, machined in lots averaging 400 pieces.



This finish-machined aluminum forging will eventually house a coaxial switch used in jet bomber countermeasure systems.

Prior to putting this aluminum housing job on their 2 AC, Thompson's Electronics Division at Cleveland had to perform the following separate operations:

1. **Drill, finish bore and face mounting flange on a No. 3 hand turret lathe.**
2. **Press bronze bushing into bore on an arbor press; and,**
3. **Finish-machine bushing bore to a total tolerance of .001 inch on a No. 3 hand turret lathe.**

Now, their 2 AC Chucker handles the complete job cycle.

Most important factor that made this changeover possible was the 2 AC's repetitive accuracy. A press fit tolerance of .001 to .003-inch had to be maintained—which meant that the 1.735-inch diameter bore had to be held within ±.0005-inch consistently on piece after piece. This posed no problem for the 2 AC.

Unique "self-contained" design features of the 2 AC—overhead pentagon turret supported by only two wide, and widely-spaced, bearings in the same housing with the spindle—more than met the job's accuracy demand. This unusual concept eliminates the cumulative tolerance problem of multiple bearing turret locating designs. Without this accuracy, automatic assembly would be a hazardous undertaking—could result in both high scrap loss and a damaged machine.

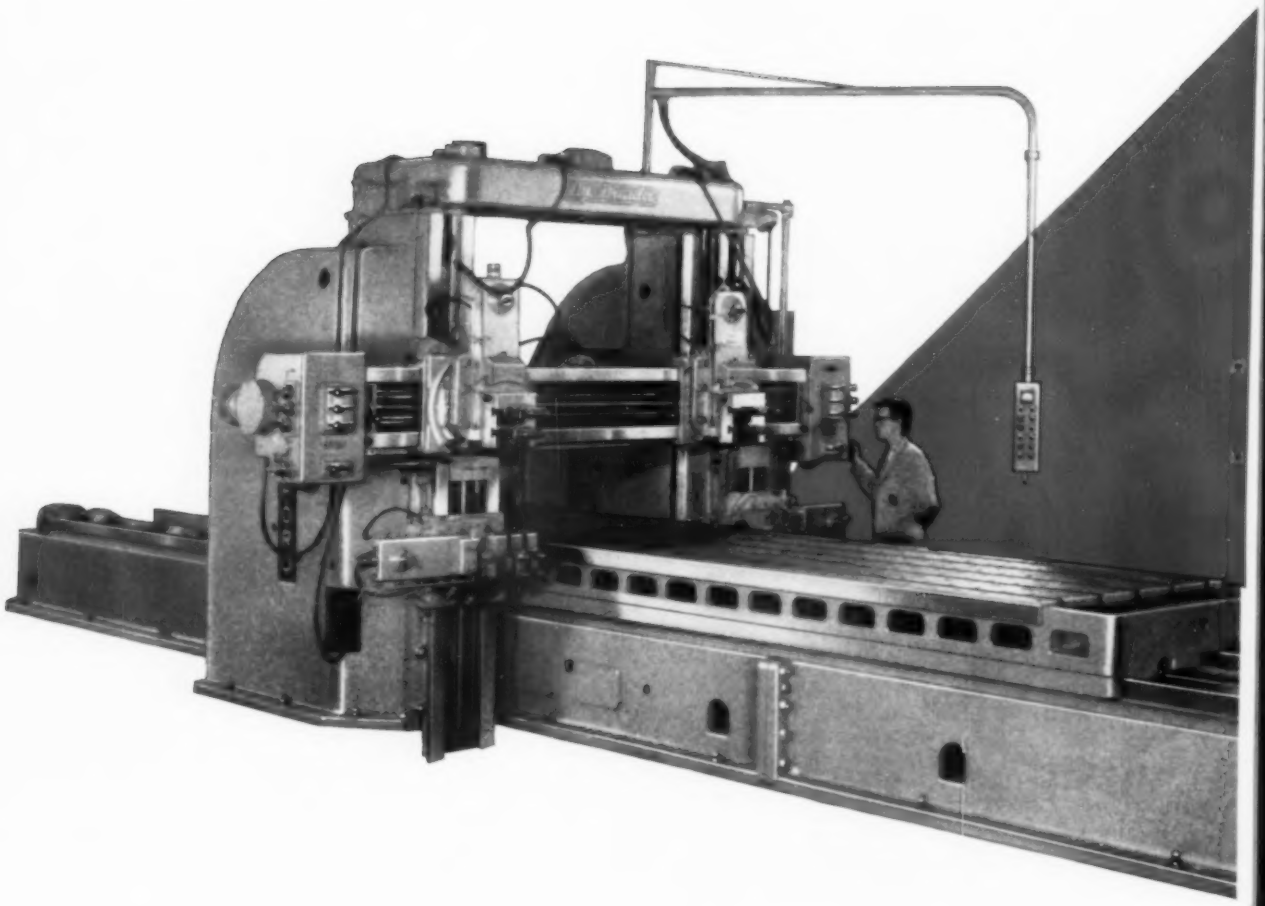
Talk today with your nearest Warner & Swasey Field Representative. Let him show how these versatile Single Spindle Chucking Automatics can materially reduce your production time—increase overall profits.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS

...WITH A WARNER & SWASEY

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

versatility of triple circuit h3 drive



shown with 4-TON work piece!

MACHINED ON DOUBLE-HOUSING

ROCKFORD HYDRAULIC PLANER

A Rockford Double-Housing Hydraulic Planer machines this huge casting, using carbide tools on 2 railheads and 1 sidehead. The exclusive hydraulic triple circuit supplies 3 cutting speed ranges for flexibility in changing from one kind of work to another. Pendant control offers selection of low range to 100 fpm., for extreme depths of cut and maximum feeds; medium range to 150 fpm., for average cuts in medium steel or cast-iron; or high range to 300 fpm., for carbide planing of steel and non-ferrous metals.

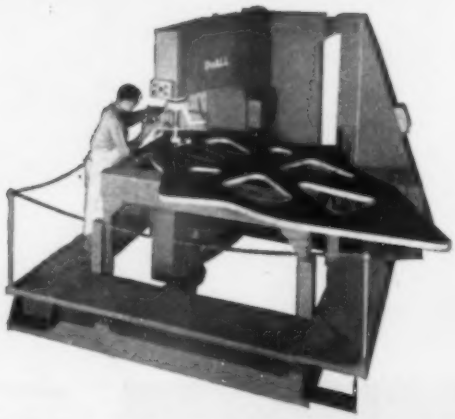
It is possible for an operator to adjust the h3 drive from 10 to 300 fpm. at the normal operating position, instantly selecting the speed range ideally suited for his individual job application.

See your Rockford Machine Tool Company representative for complete information on the versatility of the new hydraulic triple circuit h3 drive for your production work.

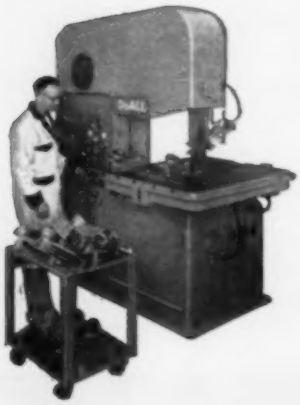
ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

THE BAND MILL answers your need for faster, more economical straight-line metal parting of heavy plate, castings, billets, bars, forgings, etc. Fluid drive work table has two-ton capacity, 40" stroke with smooth, positive feeds down to .030" per minute. Throat 26" with 24" thickness capacity. **BULLETIN No. 57-4.**

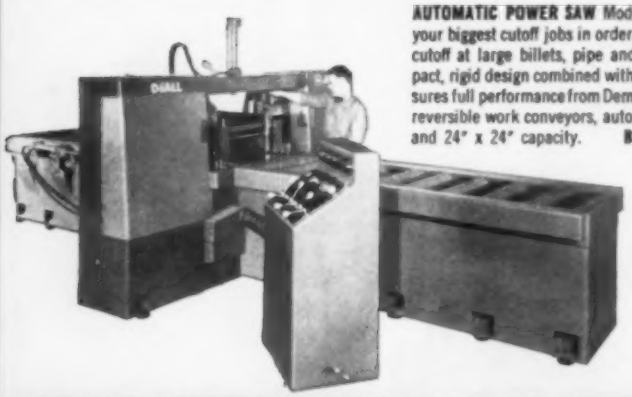


REVOLUTIONARY PAN-ARM CONTOUR machine provides a new, low-cost way for machining massive and irregular shaped workpieces. It presents a completely new concept for inside and outside straight-line or contour cutting of work sections up to 20" in thickness. The work remains stationary as the machine moves the saw blade over a 99-square-foot area—cutting in any direction.
BULLETIN No. 56-53.



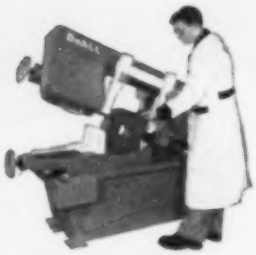
CONTOUR-MATICS for sawing, filing, grinding and polishing; cut machining time in half as compared to other methods. Super-fine finish eliminates secondary operations. Introduced with Demon HSS Blades, they give 10 times greater cutting rate and 30 times more tool life. Handle production machining and toolroom work with simplest fixtures: hydraulic power feed table, infinitely variable tool velocity, and coolant system. Available in four models, 16" to 60" throat.
BULLETIN No. 54-702.

RIGHT NOW! tool for competition



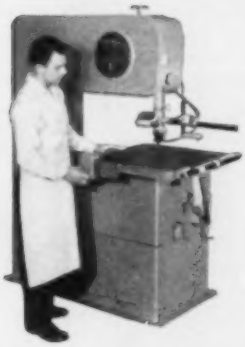
AUTOMATIC POWER SAW Model C-24 is built for your biggest cutoff jobs in order to provide low-cost cutoff at large billets, pipe and structurals. Compact, rigid design combined with extreme power assures full performance from Demon HSS Blades. Has reversible work conveyors, automatic chip removal and 24" x 24" capacity. **BULLETIN No. 58-61.**

POWER SAW Model C-58 sets world records for fast, automatic cutoff sawing—easily adapted with standard attachments to meet any specific production requirement. Designed expressly for Demon High Speed Steel Blades. Has infinitely variable speeds and 12" x 12" capacity. Also available in Model C-57.
BULLETIN No. 54-804.



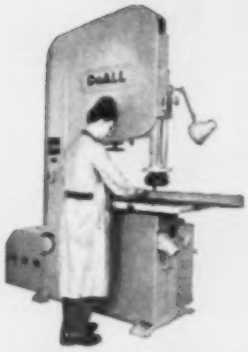
POWER SAW Model C-12 offers accuracy at low cost for the small shops or intermittent production. Ample power and rigidity assure maximum performance from Demon HSS Blades. It is unsurpassed for accurate machining of tough, expensive steels, pipe, structurals, etc. Four speeds, 12" x 12" capacity, and manual control.
BULLETIN No. 56-62.

What is your cutoff job? DoALL Power Saws will show you how they can be cut faster, cheaper and more accurately than any other machine.



CONTOUR MACHINES for general- or special-purpose sawing, filing and polishing operations. Manually operated and economically priced, they have same rugged, rigid construction, modern design and precision performance as Contour-Matics. Standard features include heavy-duty tilting table, infinitely variable tool speed, and weight-controlled power feeds. Available in 16" to 60" throat and 8½" to 13½" work height capacity.

BULLETIN Nos. 55-30 and 54-702.



ZEPHYR Band Machines for friction sawing of ferrous metals at blade velocities up to 15,000 f.p.m. and high-speed sawing of nonferrous materials. Has rigid, integrated steel construction, power feed tables, automatic brakes and variable tool speeds. Available in four models, 16" to 60" throat capacities. **BULLETIN No. 52-303.**

The setting for unmatched machining versatility and economy today!

with DoALL band machining

one sure way to reduce your metalworking costs!

In plant after plant, DoALL Band Machining answers the critical need for lower cost production. Because the new Demon High Speed Steel® Saw Blades give such outstanding performance, we introduce this new and complete line of machine tools that offer a new production era for band machining.

Now is the time to replace costly chip-by-chip machining methods with the amazing continuous-cutting efficiency of DoALL Band Machining. It provides fastest cutting, greatest versatility, least fixturing and smallest scrap with minimum machine investment.

Whatever your application, DoALL can provide the exact model of band machine you need for greatest efficiency—at prices starting from $845.00. There are machines for handling your biggest or smallest jobs on single or production rate basis. Find out now how one or more units will easily fit into your production picture. Call your nearby DoALL Store. Ask for a free demonstration—conducted right in your own plant.

Learn about DoALL's new 7-point program of continuous service—how it protects your investment—helps you cut costs. Ask for Bulletin 58-16.

Ask About Our Lease Plan

DoALL originated the leasing of machine tools. Its successful operation for many years can mean immediate savings to you. All DoALL machine tools can be leased at low rental with purchase option.

The DoALL Company,
Des Plaines, Illinois

B-51

This is a Typical DoALL Store

Sectionized Transfer-matic Machines Hydraulic Steering Gear Housings

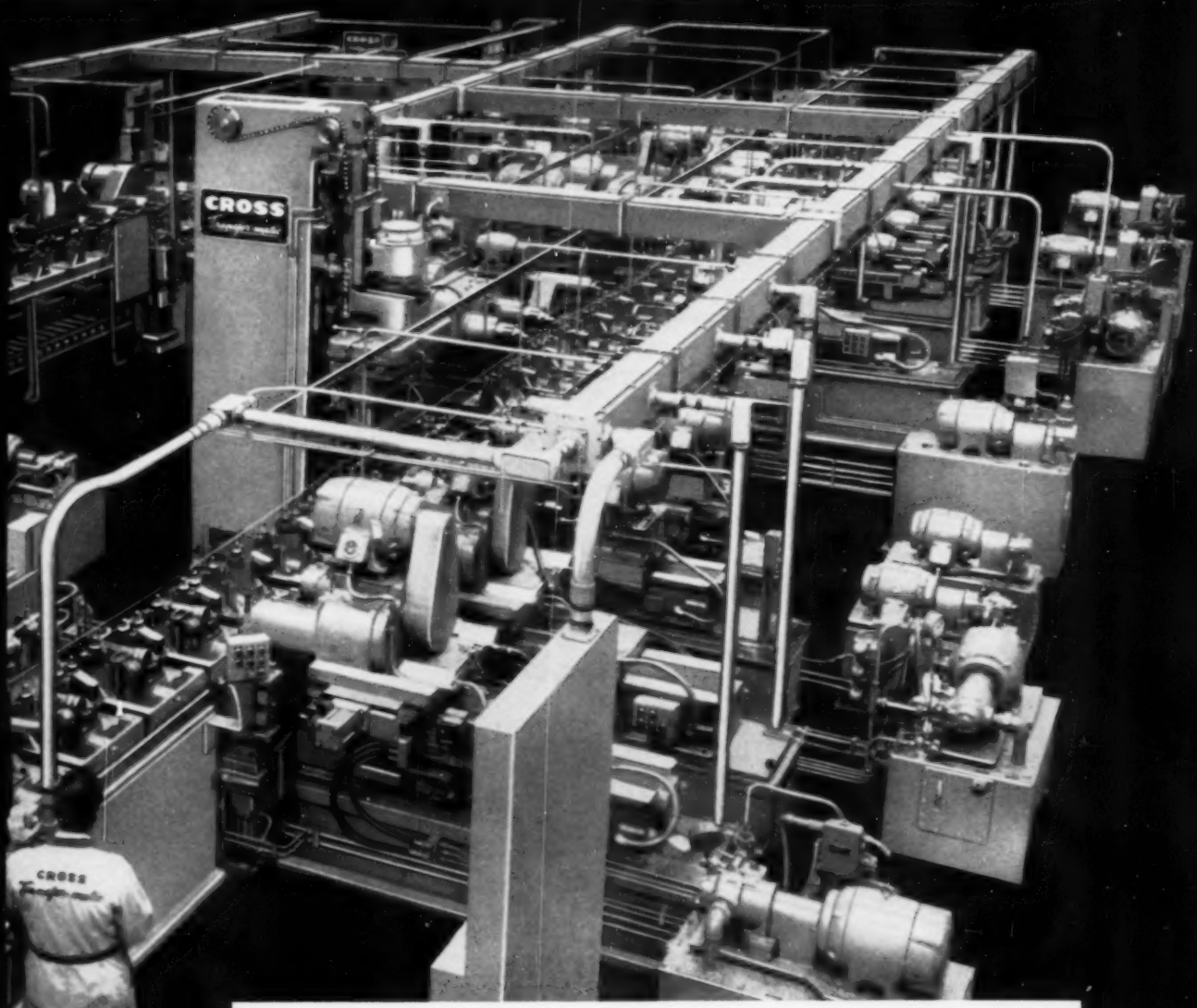
Established 1898

THE **CROSS** CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

Another Automation First by Cross



This Sectionized Transfer-matic completely machines hydraulic steering gear housings, except mounting holes which are processed in a preparatory operation. Rated capacity is 200 pieces per hour at 100% efficiency.

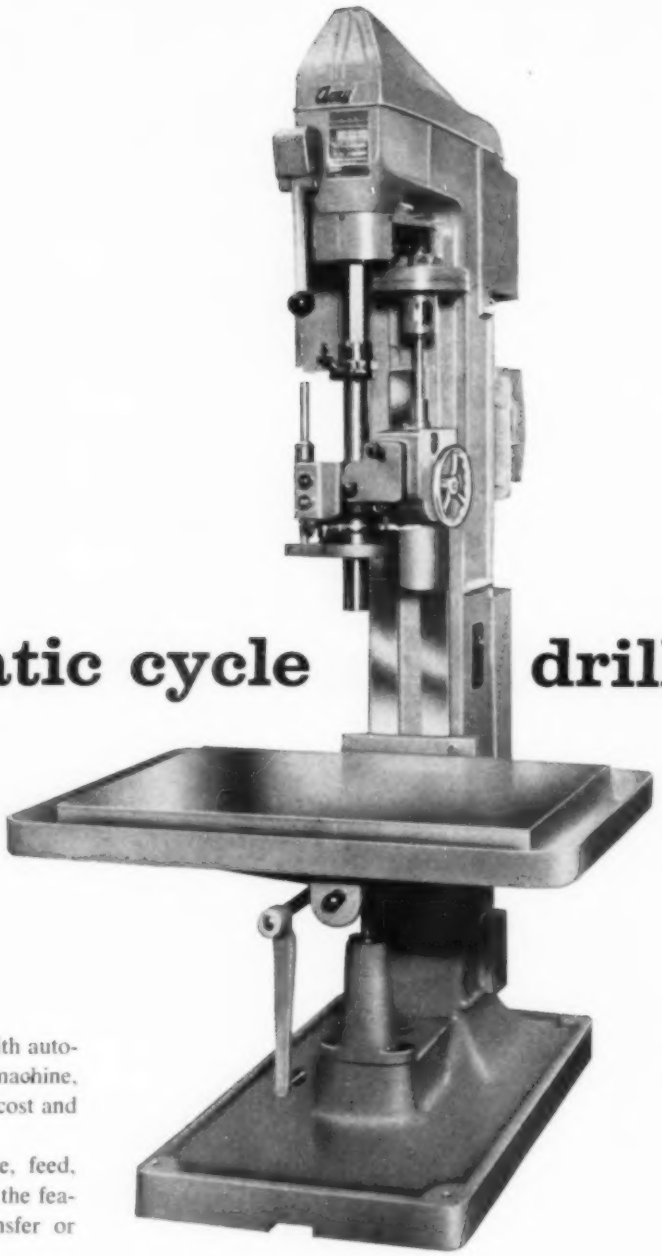
The housings are power clamped to pallet work holding fixtures which are transferred through three machine sections. In Section I, housings are milled, drilled, reamed, spotfaced, tapped and rough bored. Fixture clamps are then released to relieve machining strains. In Section II, single point precision boring completes the machining. Production is balanced by boring four parts simultaneously in each position. In Section III, air gages inspect the boring. Accumulating conveyors move the pallets between sections and provide banks of stock.

Three Cross Machine Control Units, with Toolometers to program tool changes, minimize downtime. Tool setting fixtures are provided to pre-set tools, thus eliminating trial cuts and adjustments.

Other features are complete interchangeability of all standard and special parts for easy maintenance, construction to JIC Standards, hardened and ground ways, and automatic lubrication.

■ For help in cutting the cost of your drilling operations, call one of these competent distributors near you:
Asheville: Tidewater Supply Co.
Atlanta: R. O. Deaderick Co.

automatic cycle drilling



■ You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

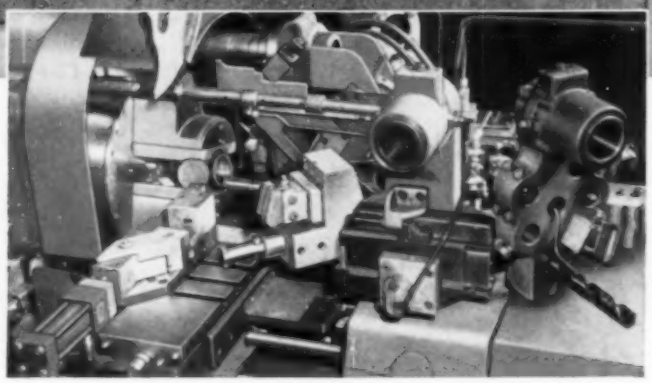
At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Motch & Merryweather Machinery Co., Box 625, Cincinnati 1, Ohio.

■ For help in cutting the cost of your drilling operations, call one of these competent distributors near you:
Asheville: Tidewater Supply Co.
Atlanta: R. O. Deaderick Co.
Birmingham: McVoy-Hausman Co.
Boston: Rudel Machinery Co., Inc.
Buffalo: Rudel Machinery Co., C. H. Briggs Division
Charlotte: Tidewater Supply Co.
Chattanooga: R. O. Deaderick Co.
Chicago: Marshall & Huschart Machinery Co.
Cincinnati: Motch & Merryweather Machinery Co.
Cleveland: Motch & Merryweather Machinery Co.
Columbia: Tidewater Supply Co.
Dallas: Briggs-Weaver Machinery Co.
Dayton: Motch & Merryweather Machinery Co.
Denver: Overgard Machine Tool Co.
Detroit: Motch & Merryweather Machinery Co.
Ft. Lauderdale: Southeast Machinery Co.
Houston: Oliver H. Van Horn Co., Inc.
Indianapolis: State Machinery Co.
Kansas City: Blackman & Nuetzel Machinery Co.

another first by Avey

Knoxville: R. O. Deaderick Co.
Los Angeles: Tornquist Machinery Co.
Milwaukee: Marshall & Huschart Machinery Co.
Minneapolis: The Satterlee Co.
Montreal: Rudel Machinery Co., Ltd.
New Orleans: Frederick & Baker Co.
New York: Rudel Machinery Co., Inc.
Norfolk: Tidewater Supply Co.
Philadelphia: Machinery Associates, Inc.
Phoenix: Southwest Machine Tool Co.
Pittsburgh: Motch & Merryweather Machinery Co.
Portland: Halladie Machinery Co.
Roanoke: Tidewater Supply Co.
Rochester: Rudel Machinery Co., C. H. Briggs Division
Rockford: Marshall & Huschart Machinery Co.
Rock Island: Marshall & Huschart Machinery Co.
San Francisco: Harron, Rickard & McCone Co.
Seattle: Halladie Machinery Co.
Shreveport: Frederick & Baker Co.
South Bend: Marshall & Huschart Machinery Co.
St. Louis: Blackman & Nuetzel Machinery Co.
Syracuse: Rudel Machinery Co., C. H. Briggs Division
Toronto: Rudel Machinery Co., Ltd.
Vancouver: Rudel Machinery Co., Ltd.
Washington: Machinery Associates, Inc.
West Hartford: Rudel Machinery Co., Inc.
Windsor: Rudel Machinery Co., Ltd.



Edward Valves Div. cuts setup time on valve bodies

takes advantage of electric setup control panel, octagonal turret, JETracer on Gisholt Fastermatic

You may spot production ideas in the way Edward Valves Division of Rockwell Manufacturing Company, East Chicago, Indiana, is increasing production of 1½" steel Univalve bodies.

A new Gisholt MASTERLINE 2F Fastermatic Automatic Turret Lathe is doing the job. With the Fastermatic's electric setup control panel, the operator preselects all important machine functions—including low spindle speeds for forming and threading, and high speeds for other operations. And with the Gisholt JETracer slide tool mounted on an 8-sided turret, a maximum number of surfaces are machined in a single chucking—with greater accuracy, finer finish and with more consistent quality.

Parts are held in an 18" 2-jaw hydraulically operated chuck. Automatic positioning at the end of each cycle speeds loading and unloading. Once the automatic cycle starts, turret tools drill, turn, face, form, relieve, chamfer, bore and thread. Cross slide tools face and chamfer. Critical internal diameters are finished to a high degree of accuracy, using turret-mounted JETracer slide tool.

Like to hear the facts on how the Fastermatic lets you utilize smart tooling...eliminate human errors...get record production on long runs, automatic cycle operating advantages on short runs? Contact your Gisholt Representative. He has the facts, and his wide experience may suggest new methods to improve your profit picture.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE Fastermatic Automatic Turret Lathe. Ask for Bulletin No. 1179.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

The brazing operation is most critical in the manufacture of carbide tipped tools. Clean, true recesses, proper amount of bonding alloy, exact placement of tips, correct application of heat and pressure, all are essential to a perfect bond.

His work is as good as his bond

At Greenfield, close adherence to these manufacturing standards, careful selection of materials plus close supervision and inspection, assure a quality bond. Yes, this craftsman's work is as good as his bond.

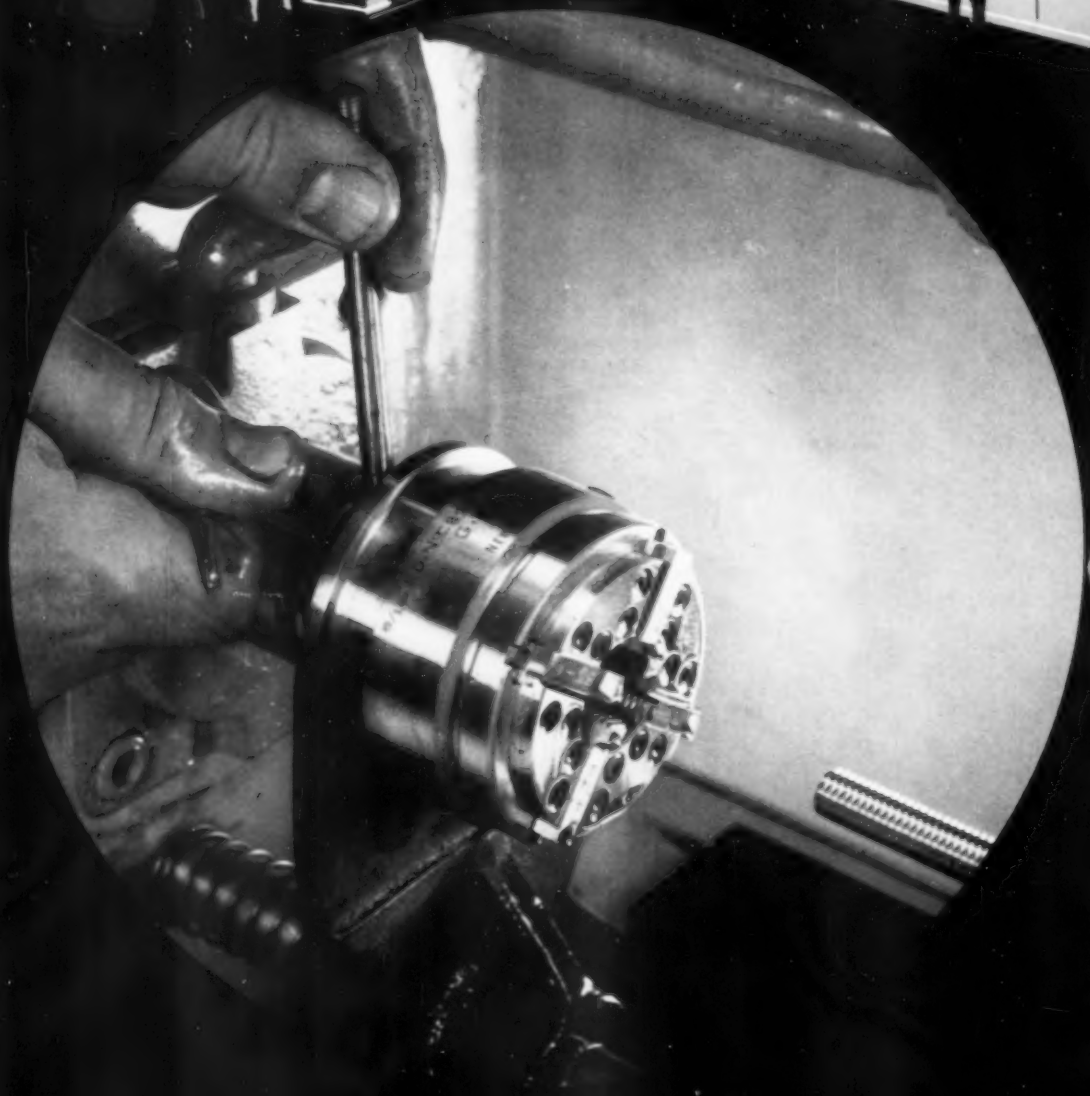
GREENFIELD TAP & DIE

GREENFIELD, MASSACHUSETTS

INDUSTRIAL DISTRIBUTOR
SERVING INDUSTRY ECONOMICALLY
THE RIGHT HAND OF PRODUCTION

GEOMETRIC Die Heads were born in a plant like this, and some of those ancient heads are still operational.

But with this streamlined Giant? We're sorry – you can still find some worn out or pretty old die heads even in them!



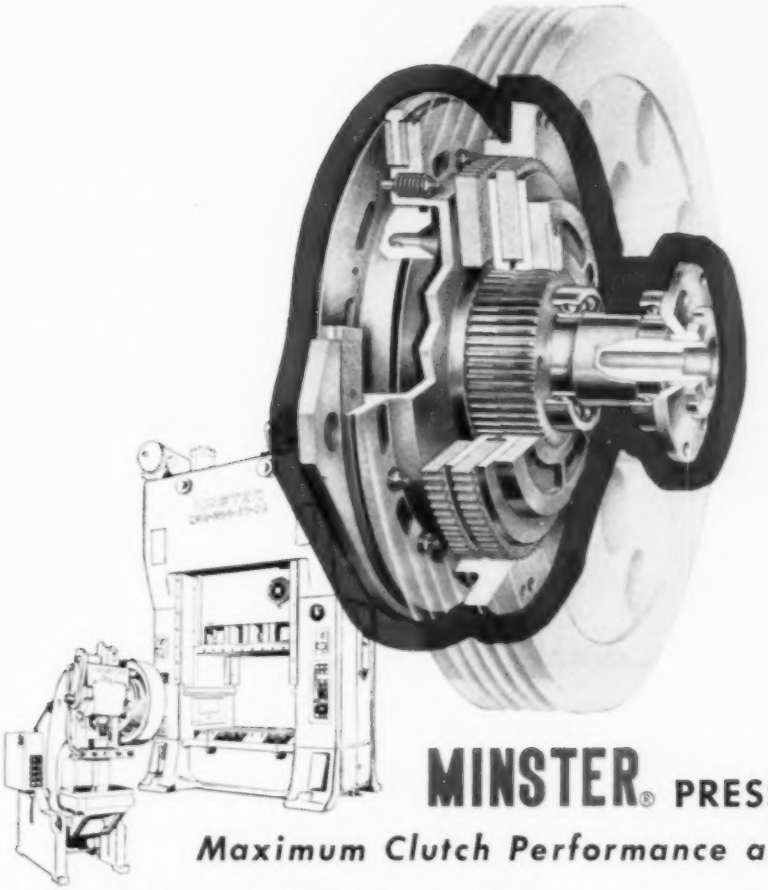
GEO MET RIC

You may "get by" with antique or worn out tooling, but you won't get ahead. Don't hold down those new, expensive automatics with out-of-date or worn die heads. A machine tool is only as good as its cutting tools. Give it a break. Give it a NEW GEOMETRIC.

CALL YOUR GEOMETRIC DISTRIBUTOR TODAY

GEOMETRIC – HORTON NEW HAVEN 15, CONNECTICUT

There's a BIG DIFFERENCE in AIR FRICTION CLUTCHES



THE MINSTER CLUTCH IS MORE EFFICIENT

MINSTER® PRESS USERS *Always Get Maximum Clutch Performance and Longest Clutch Life*

It's not unusual for the clutch and brake on a Minster press **to perform, shift after shift, on rapid single cycle operation for eight, ten or twelve years without ever being disassembled for relining.**

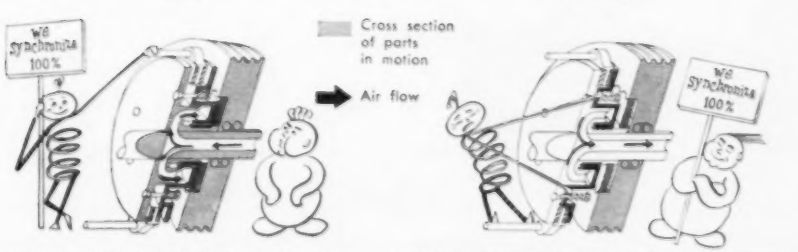
Users of all types and sizes of Minster presses consistently get that kind of service from the Minster patented Combination Air Friction Clutch and Brake.

Improvements in the design of the Minster clutch are being made continuously by Minster, **the press builder that developed and pioneered the air friction clutch for presses.** Performance records prove that, with a Minster clutch, the length of service and operational value is there.

Next time you're evaluating press equipment or considering a press clutch conversion, bear in mind, all air friction clutches are *not* alike.

THE MINSTER MACHINE COMPANY, MINSTER, OHIO

RUN **STOP**



AIR IN—CLUTCH ENGAGED—(brake off) AIR OUT—BRAKE APPLIED—(clutch disengaged)

Compare the number of parts . . .

The Minster Combination Air Friction Clutch and Brake is one synchronized unit with one moving member engaging the clutch by air pressure in one direction and applying the brake in the opposite direction as air exhausts. Movement from full brake to complete engagement is the absolute minimum, assuring fast action at any speed for quick, controlled stopping.

3 IMPORTANT DEVELOPMENTS in the NEW "68" PRECISIONAIRE

Slash Air Gaging Costs—Speed Inspection

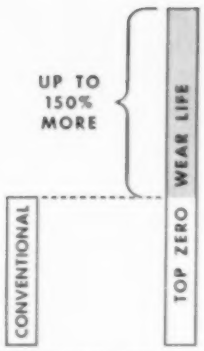
TOP ZERO TOOLING

Top Zero processing offers a choice of three ways to save:

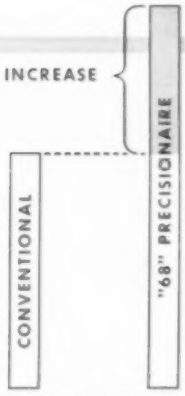
A Spindle wear life can be increased up to 150% beyond conventional practice.

or B Spindle clearance can be markedly increased to assure quickest entrance of the spindle into the work in process gaging.

or C Both wear life and clearance can be significantly greater than is possible with conventional processing, to get OPTIMUM PERFORMANCE



GREATER TOOL WEAR LIFE



LENGTH OF USABLE LINEAR SCALE

LONGEST LINEAR SCALE

A full 8" of truly linear scale and column permits the checking of wider tolerances at higher amplification—also more selections and fewer borderlines when classifying.

New "68" Series Plunjets and Adjustable Airbore Gages are truly linear over the full 8" scale

NEW HIGH-PRECISION IN AIR PRESSURE REGULATION

The new Sheffield "CONSTANTAIRE" regulator used in the "68" Precisionaire sets a new standard for precise, stable and trouble-free air regulation. After two years of field testing on a wide scale, it has proved successful even on applications where pressure fluctuations of 0.1 lb are critical

CONSTANTAIRE PERFORMANCE CURVE

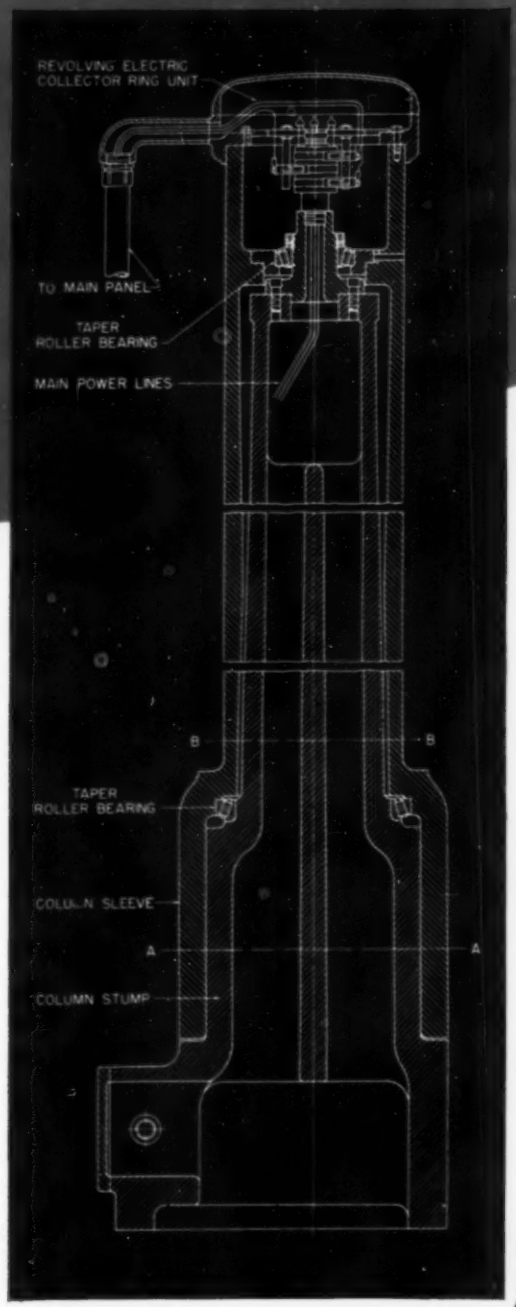
ALL THESE EXTRA ADVANTAGES AT NO INCREASE IN THE PRECISIONAIRE PRICE

8026

Write for descriptive bulletin to the ***Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 1.***

the **SHEFFIELD** *corporation*
of Bendix Aviation
manufacture and measurement for mankind

Rigidity Increased 50%



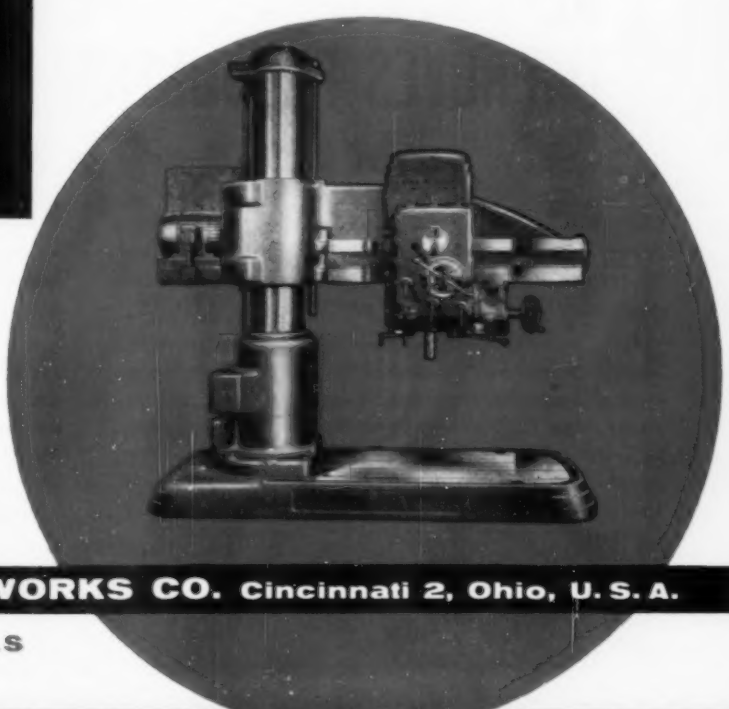
New thrust resistant, "TIMKEN" mounted column and sleeve assembly.

The new "TIMKEN" mounting of the column and sleeve on the new model 32-speed Hole Wizard Radial has hit the "jack-pot" for rigidity. It's the stiffest, most resistant column unit we've ever known.

Under drilling tests up to 30 horse power deflection has been cut in half over former models. It's truly a marvel of rigidity.

Large Timken bearings at top and bottom when preloaded bind the column and sleeve into the equivalent of a solid unit for resisting functional stresses and cuts arm deflection to an absolute minimum. This definitely results in greater accuracy and longer cutting tool life. To further increase resistance to stresses the column sleeve departs from conventional design by employing a tapered inner wall providing an unusually heavy section where the greatest functional stresses are concentrated.

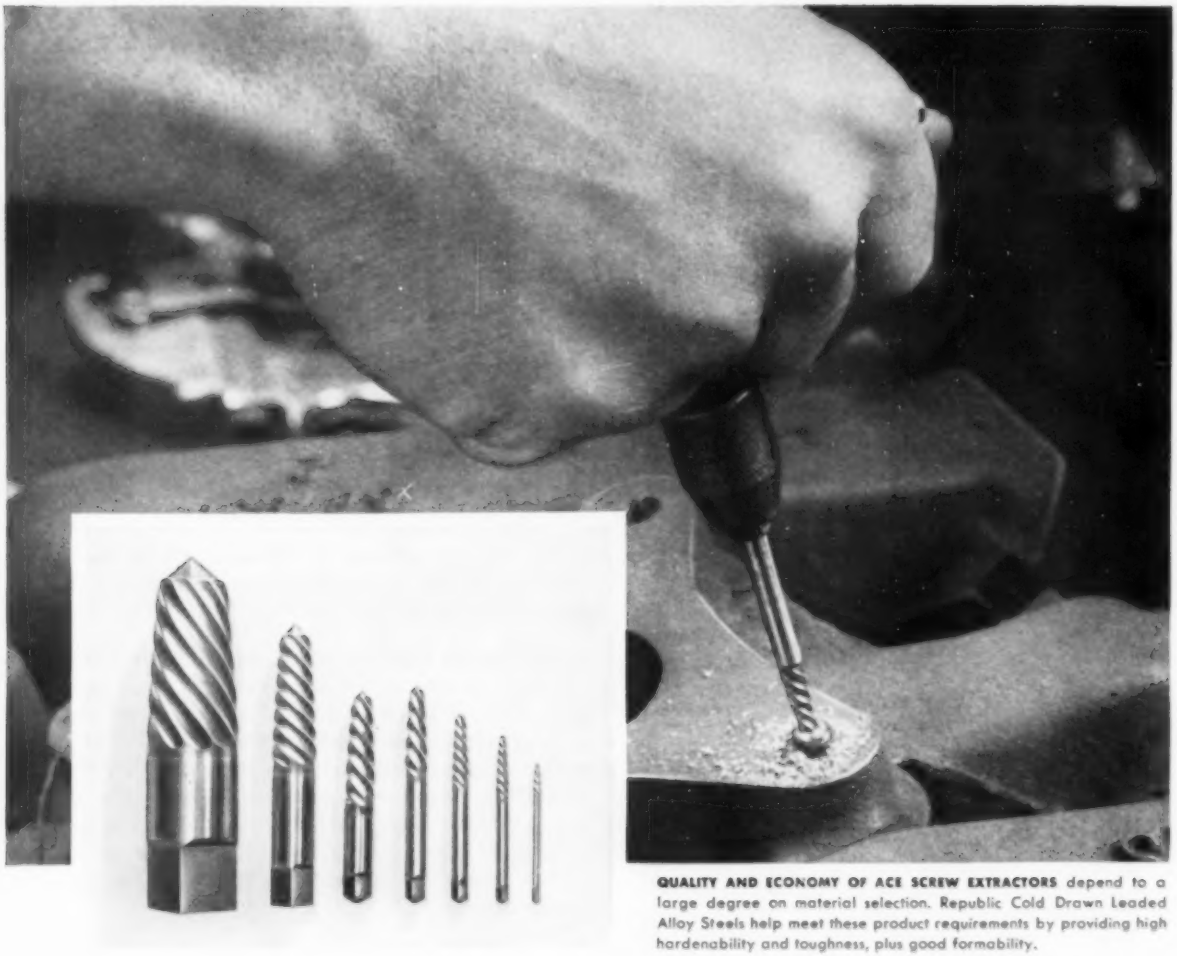
A new "NON-CREEP" clamping mechanism in combination with a solid column sleeve cuff adds greatly to the rigidity of this new "AMERICAN" Radial.



Write for Bulletin No. 328 for the complete story of More and Better Work at Lower Cost.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



QUALITY AND ECONOMY OF ACE SCREW EXTRACTORS depend to a large degree on material selection. Republic Cold Drawn Leaded Alloy Steels help meet these product requirements by providing high hardenability and toughness, plus good formability.

REPUBLIC COLD DRAWN LEADED ALLOY STEEL IMPROVES PRODUCTION AND PERFORMANCE

of Ace Screw Extractors

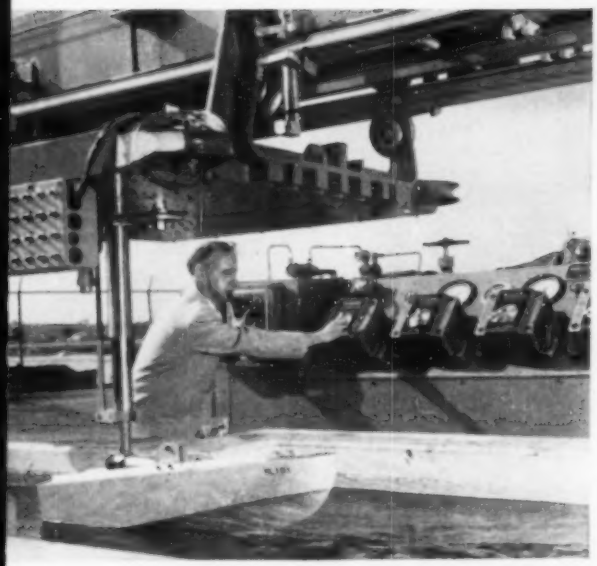
Use of Republic Cold Drawn Leaded Alloy Steel for Ace Screw Extractors helps the Henry L. Hanson Company, Worcester, Massachusetts, secure an ideal combination of production and performance advantages.

First, rolling of the extractor spirals used to require several passes, each followed by an annealing operation. Now, with Republic Leaded Alloy, separate passes can be made deeper. Result is a substantial reduction in the total number of steps. Moreover, since cold drawing improves the machinability of any given analysis, savings in machining costs are secured.

Next, in-service demands on Ace Screw Extractors require a high degree of hardness and toughness. The two Republic Alloys used (4140 and 4150) provide these properties with margins to spare. With scientific heat treatment, the finished extractors are practically unbreakable.

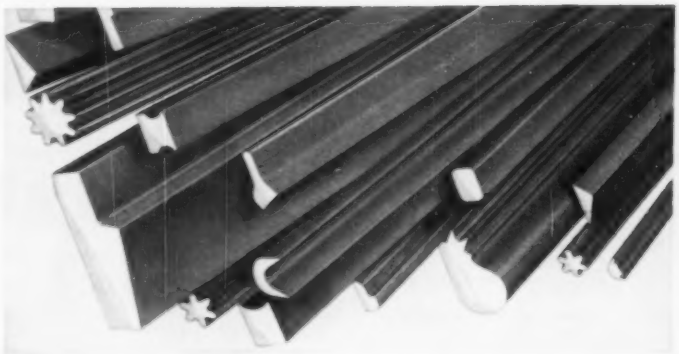
Republic Cold Finished Alloy Steels are available in every standard analysis, plus many specials, to give you the best combination of chemical and mechanical properties to suit virtually any application. Republic Metallurgists will be glad to work with you in developing still other types as required.

It will pay you to get complete information on all of the advantages offered by Republic Cold Finished Alloy Steels. Simply contact your nearest Republic office or mail coupon.



TOUGH PERFORMANCE SPECIFICATIONS make Republic Cold Finished ENDURO® Stainless Steel Bars ideal for this high-speed hull testing device. Hull models are suspended from a carriage which rolls on Republic Stainless Steel Bars. High tensile strength, close tolerance, and a fine surface finish provide smooth, precise operation of the testing device. Excellent service life is assured by ENDURO'S high resistance to corrosion, wear, and abrasion. Send coupon for further information on Cold Finished ENDURO Bars.

BRUTAL PUNISHMENT IMPOSED ON PULPSTONE STUDS during manufacturing and service is the reason why the Norton Company, Worcester, Massachusetts, specifies Republic Cold Drawn Steel Bars as basic material. Production requires a rugged combination of heavy roll-threading and machining. Completed studs are used to anchor abrasive segments to pulpstones. Pulp grinding operations impose very heavy loads on each stud. The excellent machinability, formability, and strength characteristics of Republic Cold Drawn Steel helps Norton meet all of these requirements with performance margins to spare. Moreover, finished stud cost is far less than previous minimums. Send coupon for facts.



INCREASED PRODUCTION, LOWER COSTS, IMPROVED QUALITY can be gained in parts produced from Republic Cold Drawn Special Sections. Because they are formed to the predominating cross-section of the part, special sections eliminate or greatly reduce required machining. Results are faster output and lower cost. Also, since cold drawing improves the physical properties of any given analysis, completed parts are stronger and longer wearing. Other advantages may include improved appearance and simplified design. For further information, mail coupon.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. AM-5913
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on these Republic Cold Finished Steel Bars:

☐ Alloys ☐ Leaded Alloys ☐ ENDURO Stainless Steel
☐ Carbon Steel ☐ Special Sections

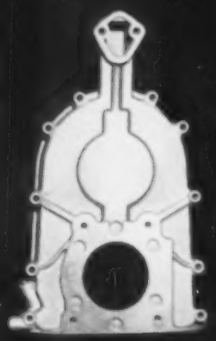
Name_____ Title_____

Company_____

Address_____

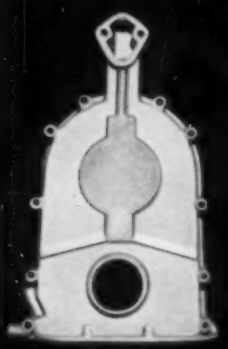
City_____ Zone____ State_____

Power Steering Cover



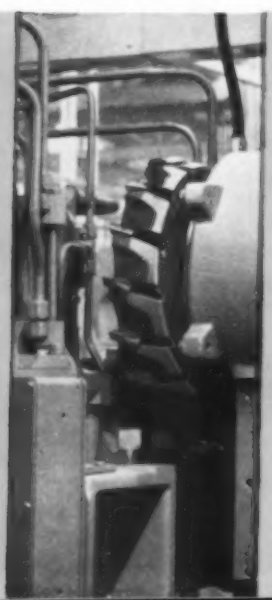
LOAD THESE TWO PARTS AT RANDOM

Conventional Steering Cover



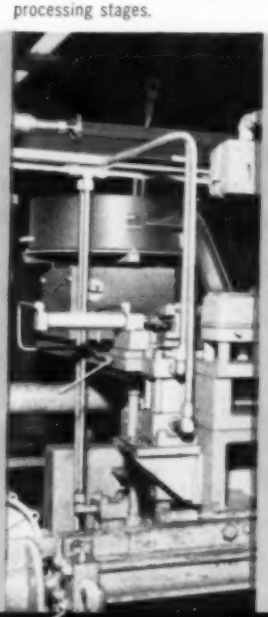
This Natco selects the cycle automatically– machines 200 parts per hour, regardless of mix

One of the two stations where milling operations are performed (machine guard-rail removed).



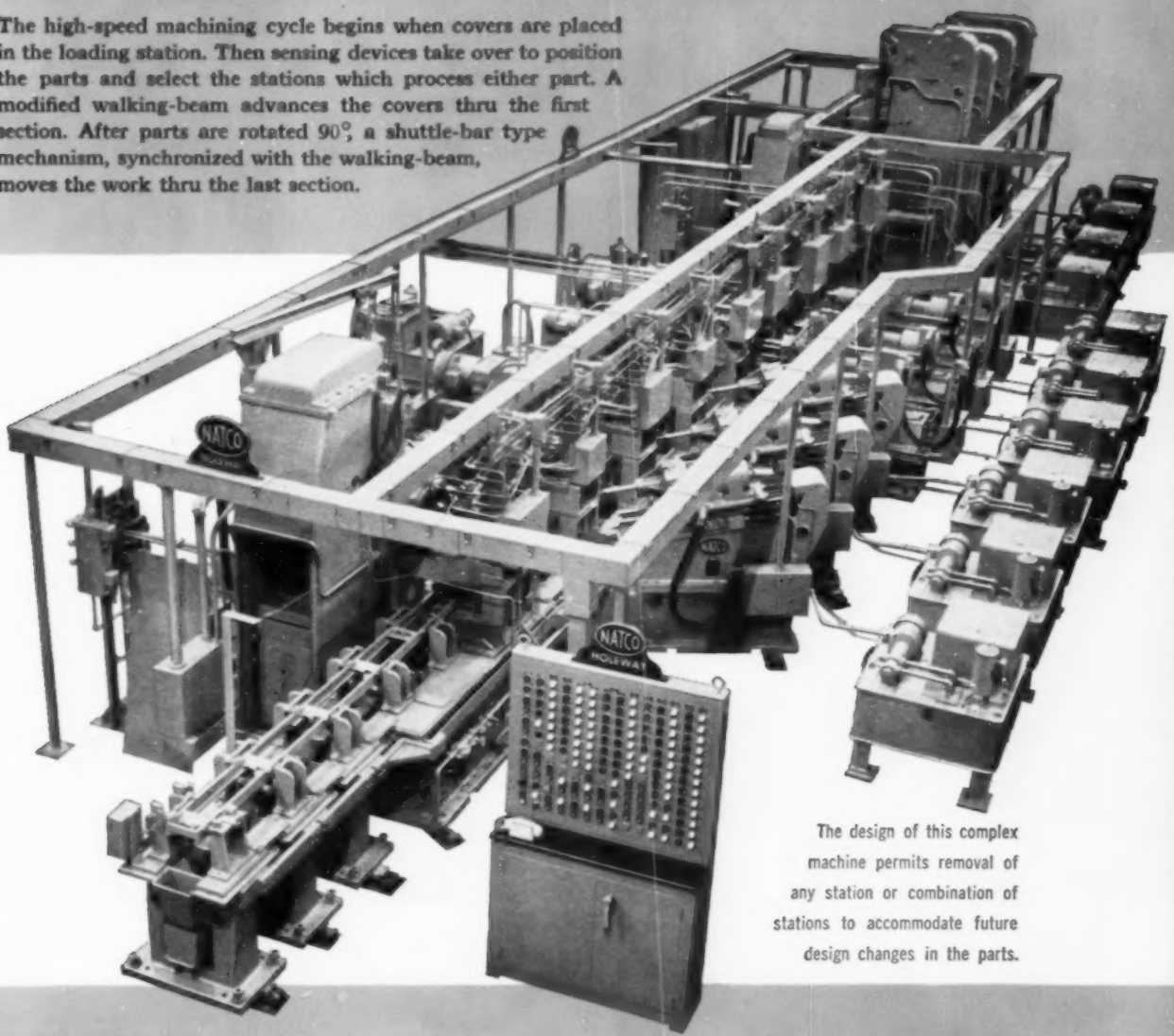
Communication with the main control pulpit can be obtained from phone jacks along the entire 68-foot machine.

A vibratory feeder delivers Welch plugs which are inserted in the necks as the covers reach final processing stages.



This 32-station NATCO Transfer and Assembly Machine is part of the automated production-line on which engines are built at a major automotive plant. The NATCO performs selectively a number of unusual processing operations in the work cycle, including milling, deep-hole drilling, Welch-plug assembling, and probing.

The high-speed machining cycle begins when covers are placed in the loading station. Then sensing devices take over to position the parts and select the stations which process either part. A modified walking-beam advances the covers thru the first section. After parts are rotated 90°, a shuttle-bar type mechanism, synchronized with the walking-beam, moves the work thru the last section.



The design of this complex machine permits removal of any station or combination of stations to accommodate future design changes in the parts.

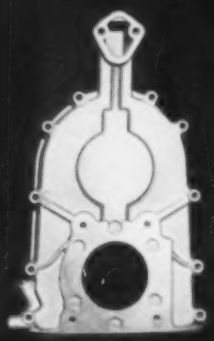
This Transfer and Assembly Machine is one of a large number of NATCOs which perform many types of complex processing operations in all kinds of manufacturing plants. A NATCO field engineer will furnish you with detailed information; a phone call may save you valuable processing time.

NATCO

National Automatic Tool Company, Inc.

Richmond, Indiana ***Multi-spindle drilling, boring and tapping machines. Special machines for automatic production. Call Natco Offices in Chicago, Detroit, New York, Buffalo, Philadelphia, Cleveland, Los Angeles; distributors in other cities.***

Power Steering Cover



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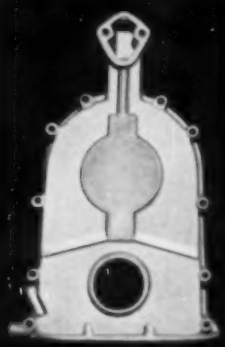

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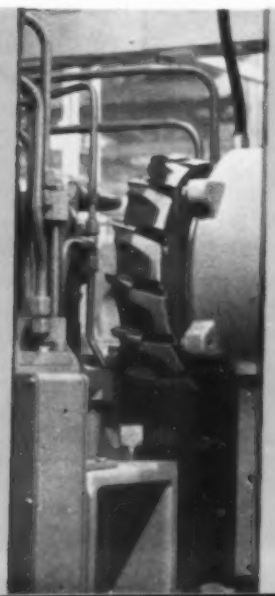

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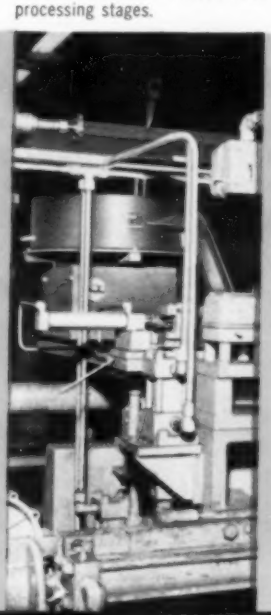

✓time reduced 75% ✓$500 fixture eliminated

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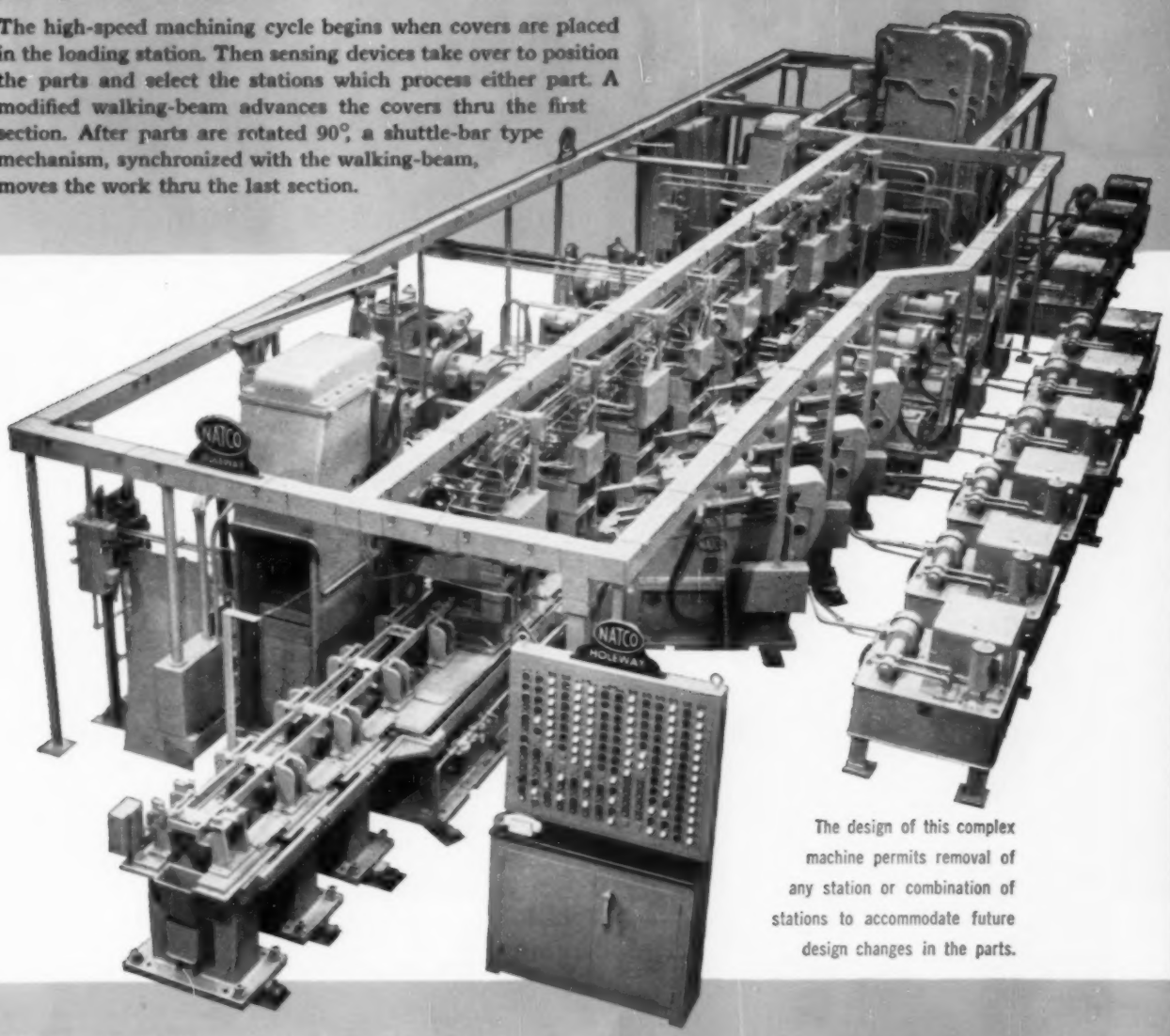

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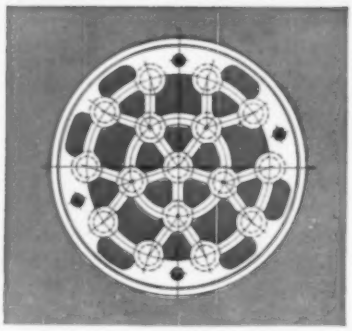
Richmond, Indiana ***Multi-spindle drilling, boring and tapping machines. Special machines for automatic production. Call Natco Offices in Chicago, Detroit, New York, Buffalo, Philadelphia, Cleveland, Los Angeles; distributors in other cities.***

✓one man runs 2 machines!

✓time reduced 75% ✓$500 fixture eliminated

Burgmaster Electropoint

Close-up Showing Standard Self-centering air vise and Set-up for Part A of 8" Valve Seat Produced on 1st Burgmaster—All Holes are machined within .0025" of true position—Produced in lots of 50-200.



Part B, Stop Plate matches with Part A, produced on second Burgmaster—Both Machines run by one Operator who also inspects parts.

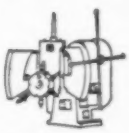
Burgmaster, the largest manufacturer of Turret Drilling Machines, offers the 2BH-T, ¾" capacity in steel, and 3BH-T 1½" capacity in steel machines with electropoint automatic tape controls.

2BH-T $25,000—3BH-T $46,000

Specialists in High Production Turret Drilling

1C Manual Power Index ⅜" Capacity

2B Manual Power Index ¾" Capacity



2BF Flange Mounted Power Index ¾" Capacity

2BH Automatic Hydraulic ¾" Capacity

3BH Automatic Hydraulic 1½" Capacity

2BR Ram Type Radial Drill ¾" Capacity

2BHT-3BHT Automatic Tape Controlled ¾" and 1½" Capacity

✓one man runs 2 machines!

tape controlled Turret Drill

with automatic numerically controlled positioning table

At Clark Brothers Company, Olean, New York, one man runs two Burgmaster Electropoint Tape Controlled Turret Drills and reduces machining time on stop plate valve parts from 96 minutes to 26 minutes each, a savings of 75%. Important is the fact that the parts are produced in lots of fifty to two hundred, and expensive fixtures, costing approximately $500 each and requiring drill bushings, are eliminated. A punched hole tape, which is made in three hours and can be stored and reused indefinitely, controls the machine to produce parts well within the .0025" tolerance required between holes. In addition, the operator has time to inspect the parts.

This actual case history is not unusual and it proves conclusively that both small and large plants producing from small lots to high production can use these Burgmaster Tape Controlled Turret Drills to advantage.

The Burgmaster Electropoint Control System can be applied to either the Model 2BHT–6 spindle or 3BHT–8 spindle Turret Drills, which are machines that are ideally suited for automatic tape control. The standard hydraulic Burgmaster controls are maintained, including pre-selective spindle speeds, infinitely variable pre-selective feeds, selective rapid approach and return, skip indexing, precision depth control, and simple manual controls for set-up. The Electropoint System automatically controls all machine functions, selects spindles in any sequence, automatically positions the table simultaneously on two axes, and clamps it in position while machining operations are being performed. All operations are carried out at their most efficient rate for high finish, precision, speed, and longest tool life.

Check into Burgmaster Electropoint Tape Controlled Turret Drilling, Tapping, and Boring Machines for your work. They can save you money from prototype to mass production work. There is a Burg direct representative or dealer near you. Call him–there is no obligation.

JOB FACTS:

Machine: Burgmaster Electropoint 2BHT–6 Spindle Turret Drilling, Tapping and Boring Machine.

Parts: Stop Plate and Seats for 8" Valve.

Material: .339 ductile iron.

Quantity: 50 to 200.

Holding: Self centering air vise, No Drill Bushings.

Accuracy: Holes $+.003$ with $-.0000$ .0025" spacing, Dowel Hole $+.0015$, $-.0000$.

Tools: Special Carbide, Step Core Drill plus Finish Reamers, and H.S.S. Drills & Taps.

Program Part: 3 Hours each.

Set-up Time: 1.5 Hours each.

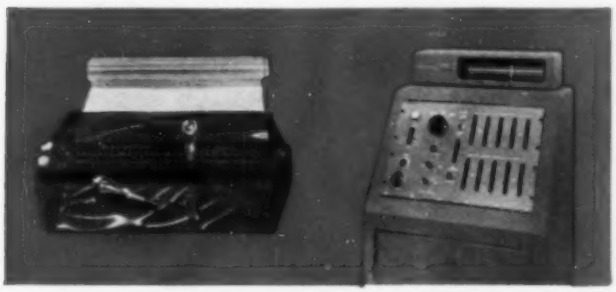
Former Method: Radial Drill using special fixtures with guide bushings.

Former Time: 96 Min. each.

Present Time: 26 Min. Floor to Floor, includes inspection each part.

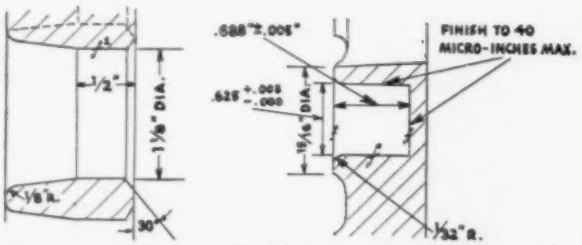
Savings: 75%, $500 spec. fixture for each part.

Note: One Man runs two Machines.



Tape Preparation is simple and Fast. Decimal dimensions and machining sequence data is punched directly into the tape (requiring no special training, codes, or computers) at an average rate of one minute per command block. Tape for this part, including 19 holes, programmed and punched ready for production in 3 hours. Punched tapes are tooling which can be stored and re-used indefinitely.

Machine Display – The display shows at all times the actual position of the table to three decimal places and the number of the operation being performed in the machining sequence. The display reads Table Positions $+.0000$ to $-.0005$. The system provides "Manual Control," "Semi-Automatic Control," "Automatic Control," or Standard Burgmaster Automatic Hydraulic Control.



Operations, Part A. Special carbide step core drill is used for drilling 1-1/8" dia., C'Sinking 30° and finish ream for smooth machine finish–16 holes; 1-.125 dowel hole, drill 5/16 –tap 3/8–16 NC, 7/16 C drill x 1/2" deep, chamfer 45°.

Operations, Part B. Special carbide step core drills to Bottom drill .625 dia. x .688 deep C'Sink 1/32" R., and Spot Face 15/16" dia. 1-16 holes; Holding 40 Micro Finish in Hole; 1-.125 dowel hole; 4-5/16" drill, 3/8" tap 16 NC, chamfer 45°.

Write for Bulletin describing Burgmaster 6 and 8 spindle Electropoint Tape Controlled Turret Drilling, Tapping, and Boring Machines. Describes how to program a part, make a punched tape, and put the job on the machine for automatic production. Thirty-minute 16mm sound film showing all Burgmaster Turret Drills in operation; available from any office without charge.

BURG TOOL

MANUFACTURING COMPANY, INC.

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Plus dealer representatives in other industrial centers.

FOR THE MACHINERY PART

THAT TAKES THE BEATING

HAYNES Alloys *will do the job!*

An example: Knives tipped with HAYNES STELLITE alloy 6K whirl at 15,000 rpm as they strip corn cobs of their kernels. Not only do they resist corrosion, but canners report that they stay sharp six times longer than previously used cutting edges.

This is typical of the results reported by design and production engineers that specify HAYNES alloys. Parts made of these alloys are operating successfully in thousands of plants – under the roughest service conditions.

If you need a tough metal part, investigate HAYNES alloys. There are more than 15 of them from which to choose, including HAYNES STELLITE cobalt-base alloys, HAYNES iron-base alloys, HAYSTELLITE cast tungsten carbide, and HASTELLOY nickel-base alloys. They are available as castings, forgings, completely fabricated parts, or as sheet and bar stock. All parts can be furnished machined or ground to specified size and finish.

Our engineers will help you pick the right HAYNES alloy to resist practically any condition of wear, heat, or corrosion.

HAYNES ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation

Kokomo, Indiana

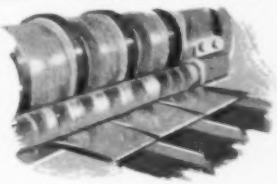
UNION CARBIDE

The terms "Haynes," "Haynes Stellite," "Hastelloy," "Haystellite," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

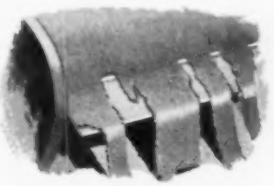
TYPICAL "HAYNES" ALLOY MACHINERY PARTS

Metal-cutting saws, made of HAYNES STELLITE alloy sheet, over 20 in. in diameter slice the tops off copper ingots.

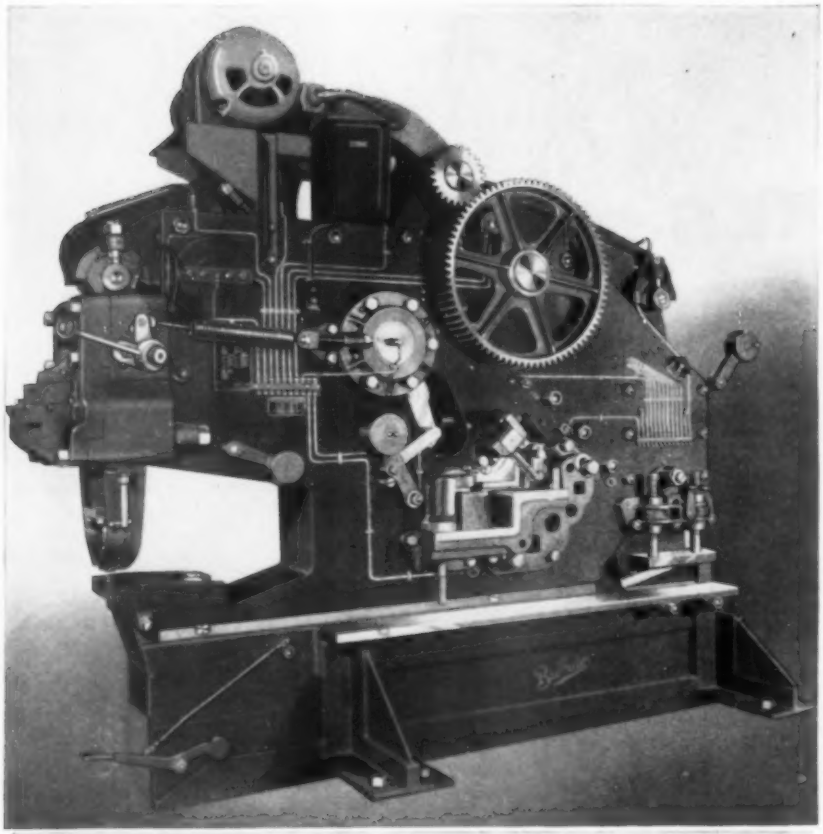
Trimming 3000 auto tires without resharpening is routine for knife blades made of HAYNES STELLITE alloy.



Slitter knives tipped with HAYNES STELLITE alloy trim miles of sheet metal in a can making operation.



Doctor blades made of HAYNES STELLITE alloy assure long service life trimming abrasive cake from filter drums.

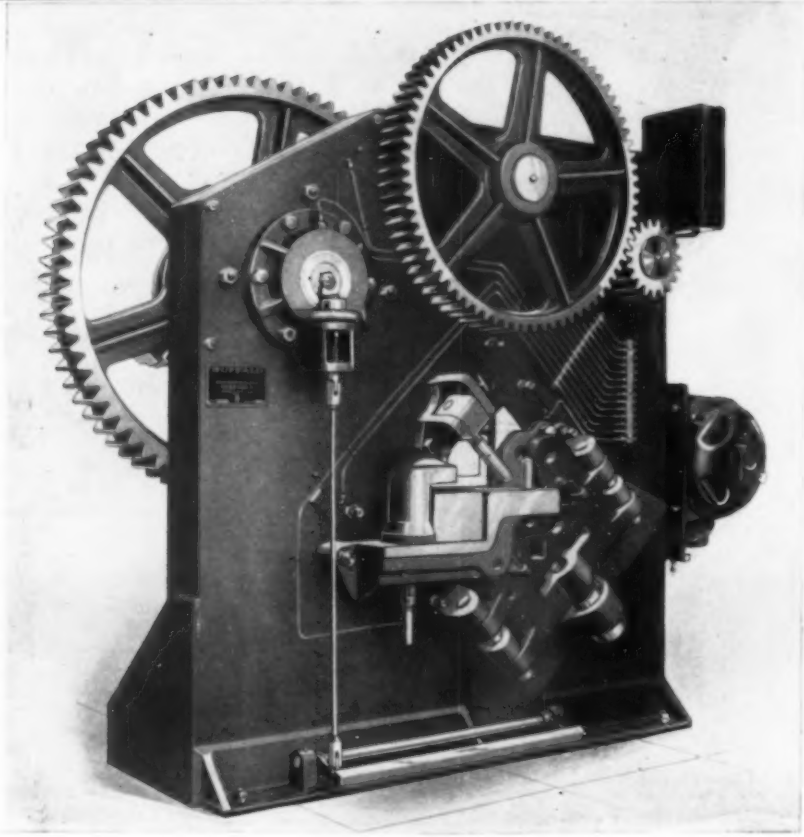


1 Machine Does the Work of 6

That's right! The "Buffalo" Universal Iron Worker (left) does the work of *six* machines, yet takes the space of only *one*. It cuts, punches, shears, slits, copes, miters and notches — two operations at once, without changing tools. The husky, long-lasting UIW works fast — pays for itself fast. See how these all-purpose machines will save space, time and money in *your* shop. Write today for Bulletin 322-Q.

Profitable Production Bending

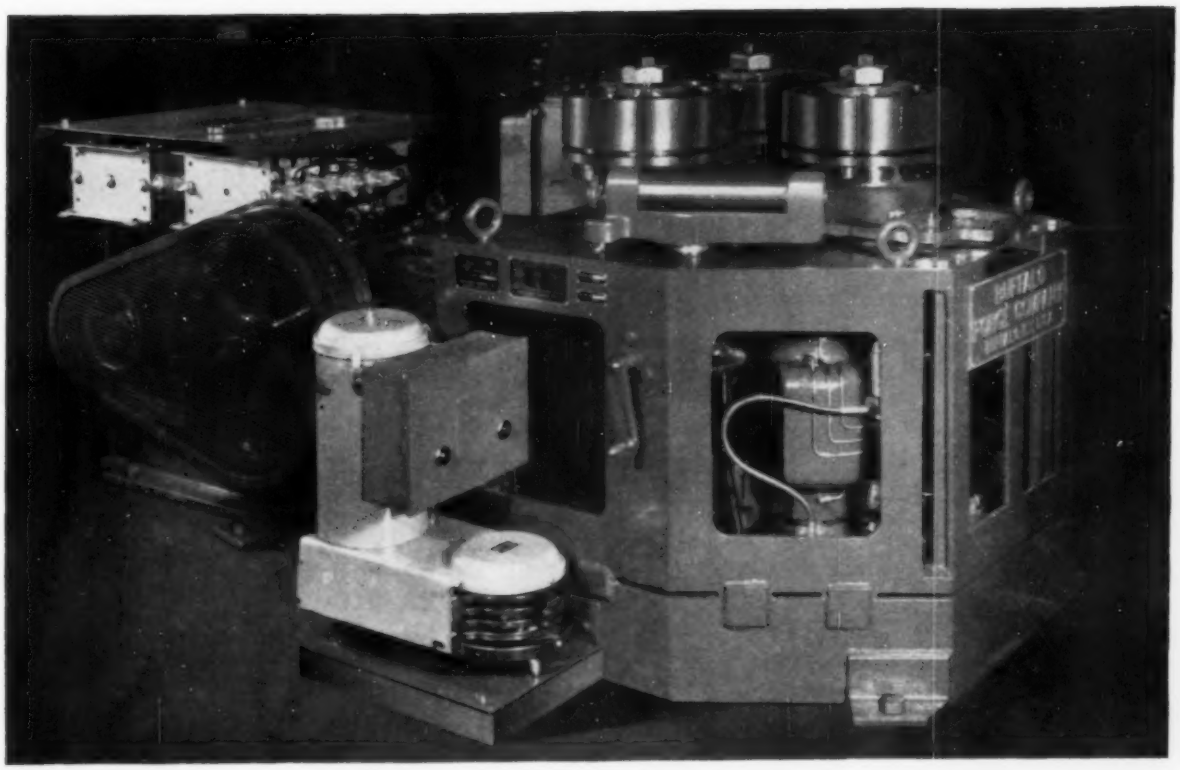
"Buffalo" Bending Rolls (right) are widely-used throughout heavy industry for cold bending arcs, circles and spirals from heavy stock. Commercially accurate curves are easily obtained at high production rates. No tooling is required; rolls are quickly and easily changed to attain the desired radii. Rolls available to handle — angles, tees, beams, channels, flats, tubes and pipes. For information on the complete line of "Buffalo" Bending Rolls, write for Bulletin 352-D.



Fast-Cutting, Versatile

"Buffalo" Diagonal Bar Cutters (Model No. 9 shown at left) are available in 6 sizes to handle rounds, squares, angles, tees, flats, beams or channels. Speeds are between 18 and 30 strokes per minute. Easy to set up, they cut squares up to 4" or rounds to 4½". Minimum tool changing is required because of large knife openings which permit flexibility of knife combinations. Write for Bulletin 3295-C, which describes the full line of "Buffalo" Bar Cutters and Billet Shears.

(Advertisement)



HANDLE YOUR "TOUGH JOBS" FAST with RUGGED "BUFFALO" MACHINES!

Fabricators of rounds, squares, tees, channels, angles, I-beams and flat bars, look to powerful, efficient, economical "Buffalo" heavy-duty machine tools to do their tough jobs *better, faster, more profitably.* You too will turn out higher quality work—a greater volume of work because these easy-to-operate "Buffalo" machines bring you built-in dependability with power to spare. Whatever your fabricating needs, chances are "Buffalo" builds the machines to fulfill them — Mill Type Shears, Billet Shears, Bar Cutters, Bending Rolls, Wrapping Rolls, Iron Workers and many more.

Discuss your heavy-duty fabricating jobs with your nearby "Buffalo" machine tool dealer, or write us direct for full information.

Every "Buffalo" Machine Tool brings you the famous "Q" Factor — the built-in QUALITY which provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY

509 Broadway • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING

ARMSTRONG

SET-UP AND HOLD-DOWN TOOLS

ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down Tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

T-SLOT CLAMP

STEP BLOCK

NON-SKID BLOCK

Write for Circular

Buy ARMSTRONG TOOLS from your Industrial Distributor

PLANER JACKS

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T-SLOT BOLTS AND NUTS

STRAP CLAMPS

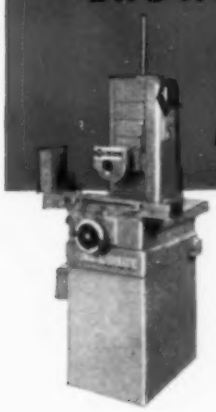
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVE. CHICAGO 30, U. S. A.

DESIGNED to meet today's toughest demands

THE NEW BROWN & SHARPE No. 510 SURFACE GRINDING MACHINE

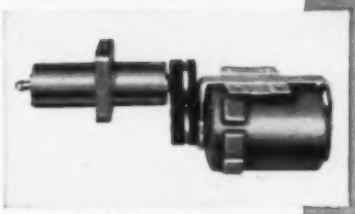


PRICED to meet today's equipment budgets

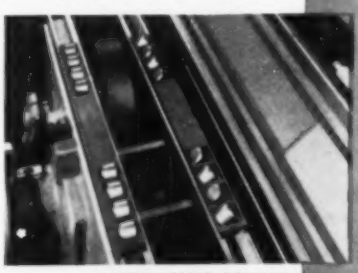
Tool and die shops, and other users of hand feed surface grinders, face increasingly tough demands today, — for high precision, for cost reduction.

The new B&S No. 510 Surface Grinder design is based on an extensive survey of these demands and needs. Add Brown & Sharpe's first-hand experience as tool manufacturing specialists, and you'll see why the new No. 510 provides the required plus in precision, work range, and efficiency.

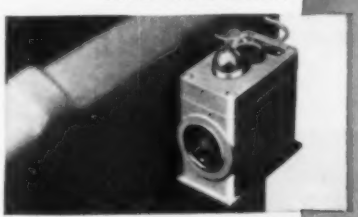
THE LOW COST of the No. 510 is a welcome surprise to everyone who sees its many advantages demonstrated. Get details. Why settle for surface grinders of limited performance and capacity, when the same investment will buy the new No. 510? For full information, write: Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.



"FULL POWER" ORIFLEX DRIVE



LAPPED TABLE ROLLERS



"ONE SHOT" LUBRICATION

GRADUATIONS READ TO 0.0002" on the Spindle Elevating Handwheel, and on the adjustable dial of the Crossfeed Handwheel, which provides close control of transverse feed.

FULL TRAVEL TABLE OF 11" is attained by moving the Table Lever only 180°.

- **"ORIFLEX DRIVE"** to unit-type wheel spindle (left) is through five "O rings" from 1 hp motor in vibration-free mountings. The No. 510 is also available with a direct motor drive spindle.

RUGGED, CAST IRON spindle slide, upright, and table base distribute 95% of the machines' 1225 lb. weight above the heavy gage sheet steel base. Base cabinet provides liberal storage space for accessories.

- **TABLE** glides on precision ground and lapped straight rollers (left) forming 90° "V" and flat guide ways — permits easy, smooth operation and preserves precision alignment.
- **"ONE SHOT" OILER** (left) lubricates entire machine by depressing plunger.

MOVABLE SPINDLE UPRIGHT for crossfeed contributes to dependable precision slot and form grinding.

CAPACITY Grinds work 11" long, 5" wide, and 12" high with 8" dia. wheel . . . 12½" high with 7" dia. wheel.

PROGRESS IN PRECISION FOR 125 YEARS

Brown & Sharpe BS

MILLING, GRINDING, AND SCREW MACHINES • MACHINE TOOL ACCESSORIES • PRECISION TOOLS • HYDRAULIC PRODUCTS • CUTTERS

Cuts assembly time in half

WITH ROTOR J4L IMPACT WRENCH

JOB: Setting spark plugs to required tightness in small utility engines. Formerly took two operations: (1) Screw in plug; (2) set plug by hand torquing to 250 inch-pounds. Now, one Rotor J4L Impact Wrench does the whole job.

RESULTS: Eliminates one operation. Time saving amounts to $22.50 per week. Full details on these tools in Bulletin 53, free on request.

Similar savings may be possible in *your* plant. Call in the Rotor Application Engineer for a study of your operations.

ROTOR TOOLS
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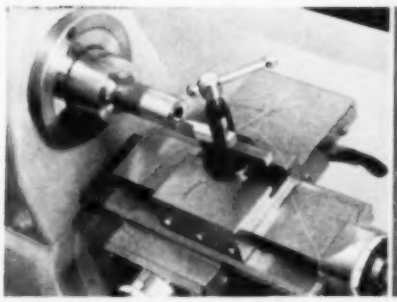
Here's the RIGHT TOOL for YOUR job!

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

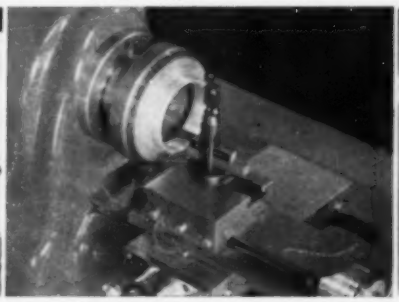
HARDINGE
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

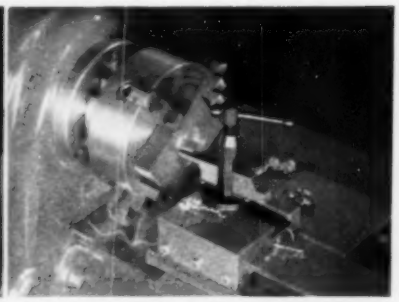
Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".

SPECIFICATIONS:
1⅛" Collet Capacity
9" Swing
17" Center Distance
Infinitely Variable Speed
230—3500 r.p.m.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results

Send for Free illustrated Bulletin DV 59

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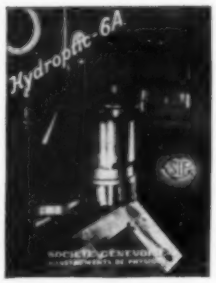
"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

. . . attained with the New SIP HYDROPTIC 6A Jig Boring and Milling Machine

Due to unprecedented cutting ability . . . increased range and capacity . . . simplification of controls . . . and ease of operation, the HYDROPTIC 6A is unmatched in performance.

Up to **30% increase** in productivity has been realized with the AUTOMATIC COORDINATE REPEATING DEVICE DIR (optional equipment) which repeats successively the initial settings made during the machining of the first workpiece.



For complete information, send for Catalog No. 1149.

As with all SIP HYDROPTICS, *accuracy is based on* SIP *High Precision* STANDARD SCALES.

AMERICAN SIP CORPORATION • 100 EAST 42 STREET, NEW YORK 17, N.Y.

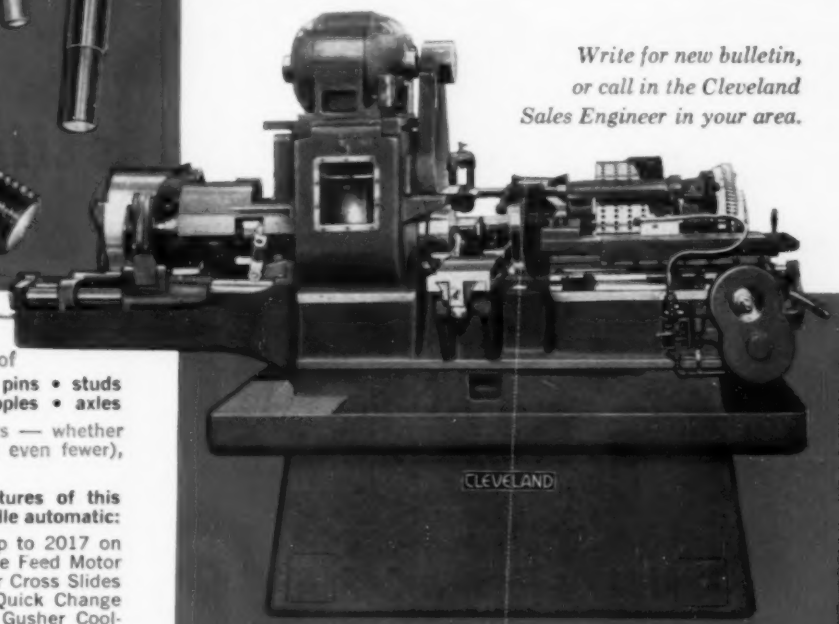
ON PARTS LIKE THESE--- keep your costs DOWN with the NEW model B

CLEVELAND

On jobs that require turning and forming multiple diameters, shoulders and tapers, you can count on your Model B Cleveland Single Spindle Automatics to give you lowest machining costs. One end working tool can be mounted on the milling slide and, by adding hopper magazine, second operation work, such as threading other ends of studs, can be performed. In many cases, parts which otherwise would require multi-machine processing can be *made complete* on the highly versatile Cleveland.

The NEW Model B's are *faster*, too . . . with many design improvements and new features that give you new performance potential. They are fast-cycling, quick and easy to set up, fully automatic . . . ideally suited for both short and long run jobs.

Write for new bulletin, or call in the Cleveland Sales Engineer in your area.



New Model B Clevelands are built in 1⅝" and 2½" capacities; also available to handle 18" work lengths.

Use YOUR New Model B

for fast, economical production of

armature shafts • arbors • pins • studs • transmission shafts • nipples • axles

and countless other similar parts — whether you need 50 pieces (sometimes even fewer), or thousands.

Here are some of the new features of this versatile and practical single spindle automatic:

Increased Spindle Speeds (up to 2017 on the 1⅝" machine) • Separate Feed Motor • Independent Front and Rear Cross Slides • Quick-set Stock Feed • Quick Change Collet and Feedshell Pads • Gusher Coolant Pump • Automatic Lubrication

EXTRA Accessories Include Cross Slide Turning Attachment, Hopper Magazine, Independent Cut-off Attachment, Automatic Bar Loader.

Remember, CLEVELANDS CUT COSTS!

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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CLEVELAND • DETROIT
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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

As you can see at the right, pre-war welders had considerably more guts than most of today's "so-called" heavy-duty units. If you need real heavy-duty machines–ask yourself

Where'd the GUTS .....

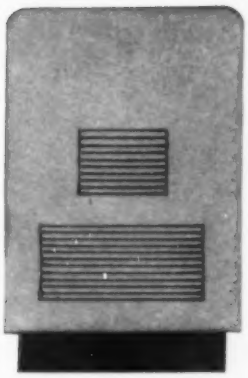
...you can still get 'em

Today's A. O. Smith Welders surpass even the best of pre-war units

PRE-WAR WELDER*	POST-WAR A. O. SMITH*
Average Copper Coil Weight 180 lbs.	**Copper Coil Weight 186 lbs.**
Height 46 in.	**Height 47½ in.**
Temperature rise — 55°	**Temperature rise — 55°**

*500 amp heavy-duty a-c welder

NOTE: A. O. Smith also offers the Challenger line of a-c welders competitive in size and strength with today's "so-called" heavy-duty units.



PRE-WAR WELDERS*

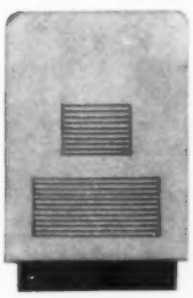
Average Copper Coil Weight 180 lbs.

Average Height 46 in.

Average Temperature rise 55°

*Heavy-duty a-c (500 amps)

go?



POST-WAR WELDERS*

Average Copper Coil Weight 100 lbs.

Average Height 40 in.

Average Temperature rise 120°

*Heavy-duty a-c (500 amps)

...but only from A.O.Smith!

The amount of copper in the coils is one of the largest single factors in the life expectancy and efficiency of a welding machine.

While many other types of equipment, through use of new materials and new design, have become smaller without any sacrifice in efficiency or service life — *welding machines are an exception!*

A. O. Smith welding machines have practically twice as much costly copper in their coils as other welders . . . they offer many other outstanding additional advantages. These advantages include 1/6-hp, totally-enclosed, ball-bearing, pre-lubricated fan motor (biggest in the industry) and 18-inch, big volume fan . . . Jet-stream ventilation . . . silicone insulation . . . and 75 open circuit volts.

Result, though rated at 60% duty cycles, these A. O. Smith welders could be operated at 100% duty cycles and still out-live competitive machines operating at 60%. There's nothing on the market today that can compare. Write direct or contact your man from A. O. Smith for conclusive evidence.

Through research A.O. Smith *. . . a better way*

A.O.Smith

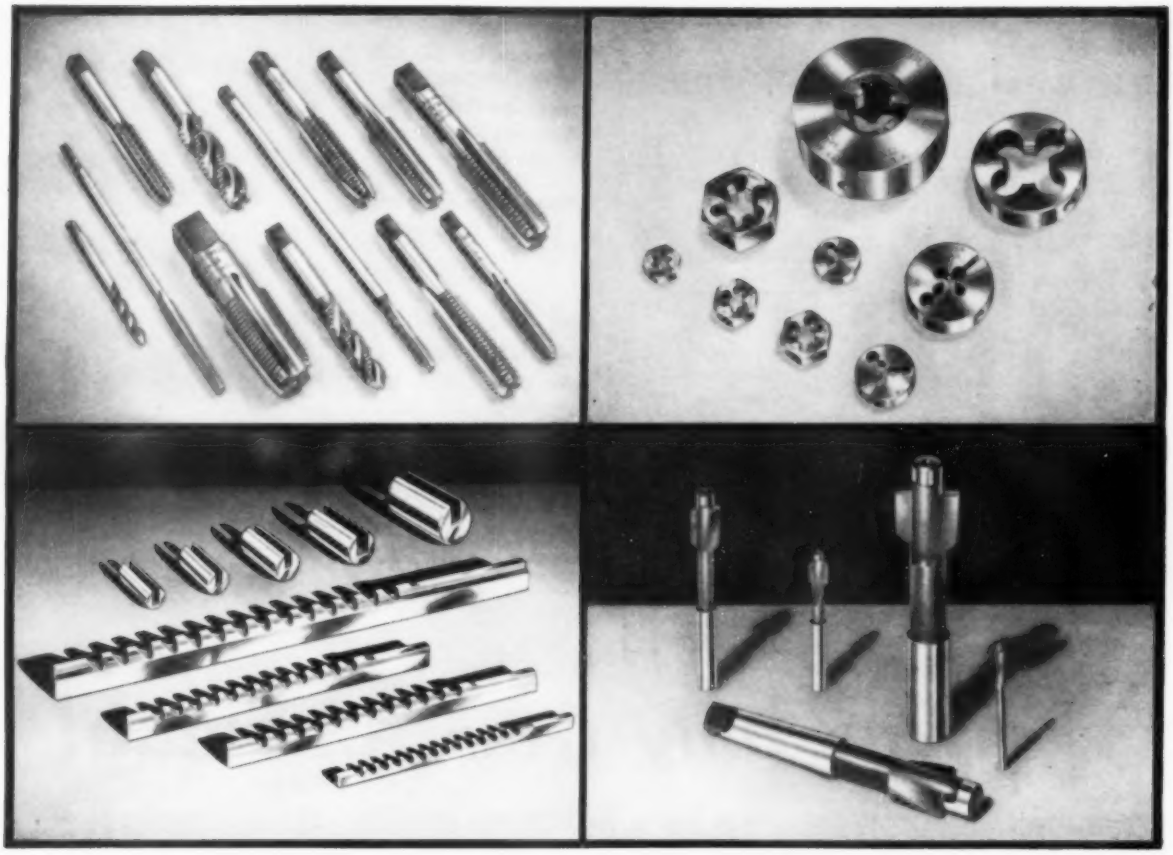
CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

THREADWELL CUTTING TOOLS



FOR EVERY APPLICATION

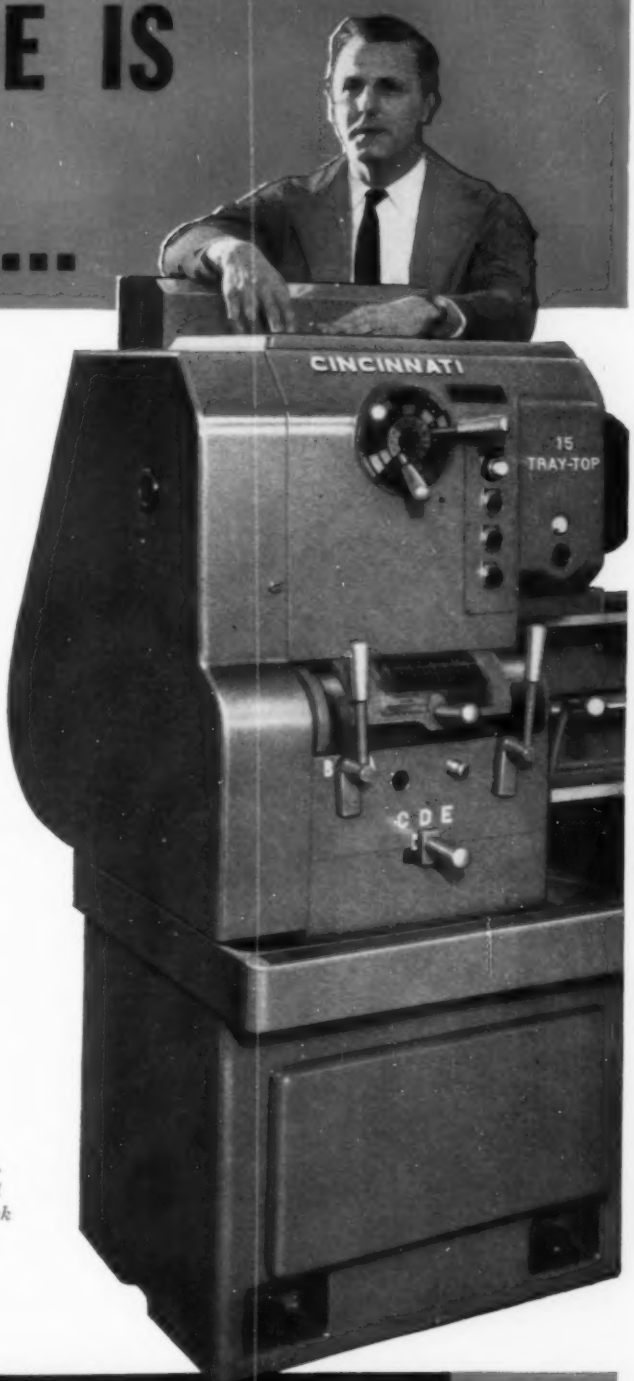
Regardless of application Threadwell has the right cutting tools for the right job. Proof of their superior quality and accuracy is evidenced in their performance. Why not experience the confidence all Threadwell users enjoy and include Threadwell in your production plans . . . now.

See your Threadwell distributor
for the finest in Taps, Dies, Counterbores,
Keyway Broaches *and Gages.*

Threadwell

THREADWELL TAP & DIE COMPANY
Greenfield, Mass., U.S.A.

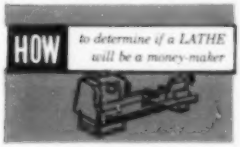
THIS LATHE IS WORTH MORE...



It gives lower production costs, less downtime, fewer rejects. And economy-priced Cincinnati Tray-Tops are husky and versatile enough to handle some of the jobs that often tie up heavy duty machines.

Wide spindle speed range in geometric progression provides the right speed for every job; *full feed range* meets all roughing and finishing needs; *control convenience* affords minimum operator effort with maximum safety; *rugged construction* assures maintained accuracy and lowest maintenance costs.

Do You Have Your Copy of This Booklet?



It tells you how to determine if a lathe will be a money-maker. Ask your C L & T Dealer, or write us direct.

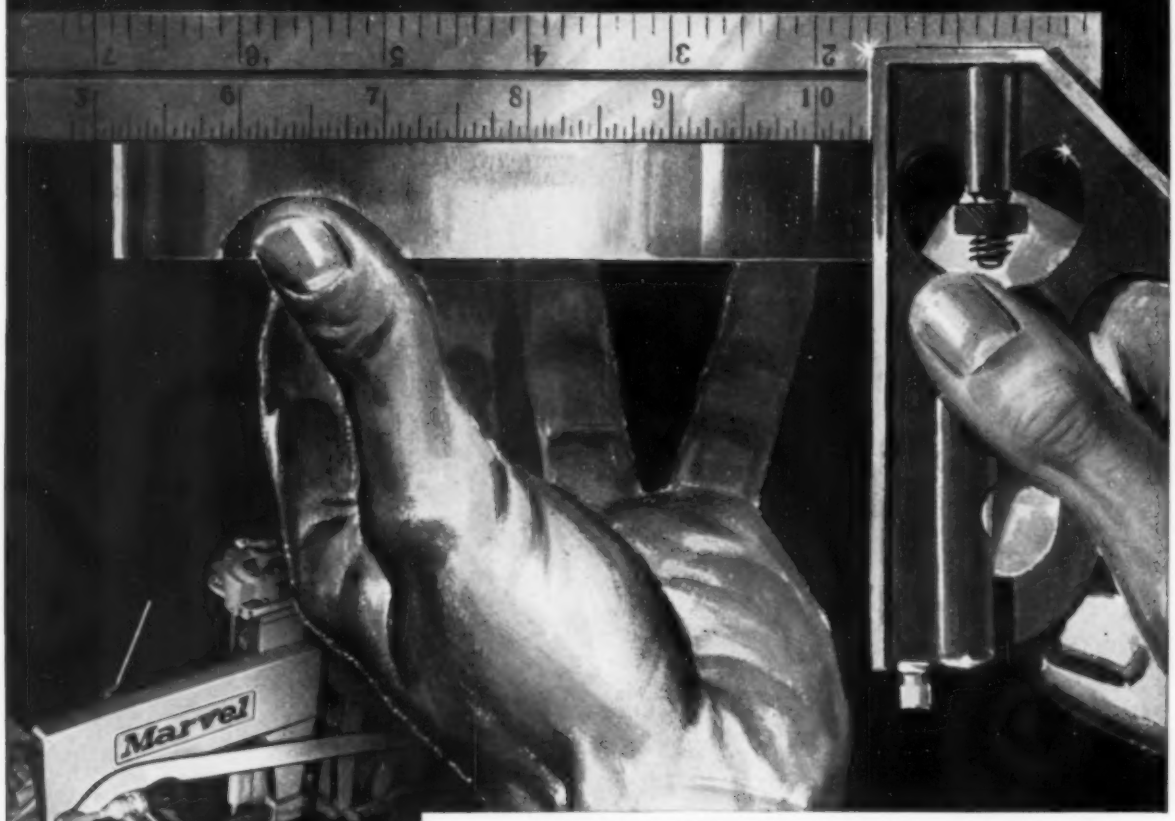
Improved Machining Through Research

CINCINNATI LATHE AND TOOL CO.

3207 Disney Street • Cincinnati 9, Ohio

"TRAY-TOP" Lathes / "CINCINNATI" Drilling Machines / "SPIROPOINT" Drill Sharpeners

IN CUTTING-OFF OPERATIONS...



...SPEED WITHOUT ACCURACY IS COSTLY!

Efficient cut-off of steel blanks from bars demands a combination of speed *and accuracy*. MARVEL, and MARVEL alone, achieves this combination with machines capable of delivering feeds and speeds which fully utilize the strength and heat resistance of the modern high speed hack saw blade.

MARVEL dual power feed and crank lever method of reciprocation are two exclusive features designed to give increased speed and efficiency. This unique dual power feed employed on the Series No. 6 and No. 9 MARVEL Ball Bearing Hack Saw Machines, simultaneously controls both positive feed depth and feed pressure, automatically adjusting both pressure and depth of feed correctly in proportion to the number of teeth in contact with the work. This automatically forces the blade to cut as deeply as possible and practical on every stroke, without demanding the attention of the operator. As a result, the work is cut-off in the fewest possible number of strokes. Quick return of the saw frame on the non-cutting stroke, accomplished by the crank lever, delivers 33⅓% more cutting strokes per minute without increasing the blade velocity on the cutting stroke.

Accuracy is assured by the construction of the machine itself. Anti-friction ball or roller bearings are used at all load carrying points. The saw frame reciprocates on fully enclosed special design ball bearings which are factory adjusted with a pre-load, assuring permanent frictionless rigidity. Saw frame, saddle, and upright are precision machined and fitted to form a rigid integral unit capable of withstanding any cutting load with no deflection or side movement.

These exclusive features found only in MARVEL Hack Saw Machines, together with the unequalled performance of the unbreakable MARVEL High-Speed-Edge Hack Saw Blade, form a team that guarantees the fastest, most accurate cutting-off.

There is a MARVEL field engineer near you capable of intelligently discussing your cut-off work. Send for catalog C-55, and the name and address of your nearest MARVEL field engineer.

S-1300

ARMSTRONG-BLUM MFG. CO.
5700 WEST BLOOMINGDALE AVE. • CHICAGO 39, ILL.

Metal Cutting MARVEL SAWS
Better Machines–Better Blades

Why the Die Designer Prefers PRODUCTO Die Sets

He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand." They're easy to get anywhere... and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
975 Housatonic Ave., Bridgeport 1, Connecticut

Wherever die sets are used

PRODUCTO

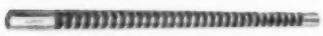
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

Cut a KEYWAY in 1 Minute

In one minute and for as little as one cent you can cut a keyway with a Minute Man Keyway Broach Kit. For keyways from 1/16" to 1" in any bore from 1/4" to 3".

Save time with these other
STANDARD STOCK BROACHES

SQUARE BROACHES



HEXAGON BROACHES

***New* ROUND BROACHES**

Used in an arbor or hydraulic press for finishing holes to exact size in *one pass*. 1/8" to 1/4" squares and hex's; 1/4" to 1" rounds. Production Type Keyway Broaches also in stock.

SEND FOR CATALOG AND PRICE LIST

The duMONT CORPORATION
Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST A describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name .....

Company .....

Address .....

Letters...

To American Machinist
330 W 42nd St, NY 36, NY

How many tools?

Dear Sirs:
I would greatly appreciate receiving any data or information you can supply on the number of machine tools of each type sold annually in the US. Also the number estimated to be in service.

E F Cladwell
Radio Corp of America
Camden, NJ

Full details on numbers, types, and geographical distribution of machine tools in the US are contained in the American Machinist Inventory of Metalworking Production Equipment.

The Inventory *is published every five years, and a new issue is scheduled to appear later in 1958.*

We are collecting information from thousands of metalworking concerns in all parts of the country and will publish the tabulated results on Nov 17—Ed.

That pencil on the cover

Dear Sirs:
I imagine that by this time you have received many favorable comments regarding the cover design of your April 21 issue.

The above issue has been on my desk about a week, and I have repeatedly reached for that pencil.

In my opinion, you are certainly to be congratulated. . . .

L J Wiegand
Sidney Machine Tool Co
Sidney, Ohio

Dear Sirs:
. . . has proved so amusing and effective that we felt you should be complimented for the excellent perspective you have attained.

J High
Aviation Developments Inc
Burbank, Calif

Dear Sirs:
That April 21 cover is driving us crazy. Everybody is trying to pick up that damn pencil.

Very good . . .

Robert Stock
Lycoming Div of Avco Mfg Corp
Stratford, Conn

Dear Sirs:
Had to write and congratulate you on the front cover. . . .

I am wondering how many other readers found themselves

SHOPMATES

N. Jarvis

I DON'T KNOW WHAT'S THE MATTER — BUT IT DON'T SOUND RIGHT — HOW LONG WILL IT TAKE — TEN - TWENTY MINUTES MAYBE ? HUH ? HUMM ??
THERE'S NOTHIN' WRONG WITH THE PRESS — MAC FOGG JUST WANTS TO SNEAK OUT FOR A SMOKE AN' DON'T DARE WALK OUT LIKE THE REST OF US .
N. JARVIS

This "SPECIALIZED" Leland-Gifford

DRILLS DEEP HOLES IN DIE CASTINGS

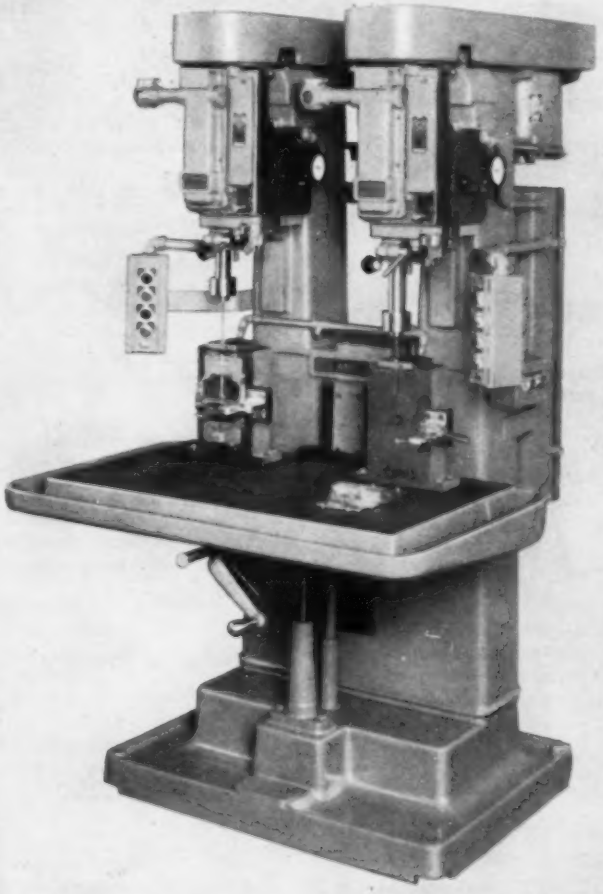
at 250 pieces per hour

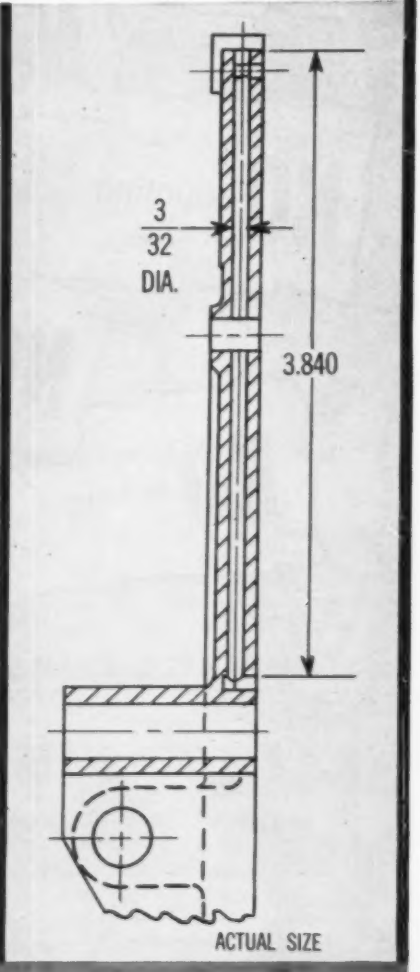
Small diameter deep holes . . . drilled to precise depth to meet an existing cross hole . . . through thin sections of die cast aluminum — this is a job on which you would settle for accuracy and not expect quantity production. But Leland-Gifford developed this two-spindle drilling machine that delivers both performance *and* production . . . proving once again that you never know how effectively a drilling problem can be solved until you talk to Leland-Gifford.

DO IT RIGHT and DO IT FAST...

Two self-contained drilling units are mounted on a standard pedestal over twin work-holding fixtures. Hydraulic feed with step by step control assures fast, automatic drilling to accurate depth and dimension.

Call in your nearby Leland-Gifford sales engineer.





LELAND-GIFFORD
SPECIAL
DRILLING MACHINES

WORCESTER 1, MASSACHUSETTS
U. S. A.

Chicago 45
2515 W. Peterson Ave.
Detroit
10429 W. McNichols Rd.
Cleveland 22
P. O. Box 853
New York Office
75 S. Orange Ave.
South Orange, N.J.
Los Angeles Office
2620 Leonis Blvd.
Vernon 58, Cal.
Indianapolis 6, P. O. Box 1051
Rochester 12, P. O. Box 24, Charlotte Station

NOs for News

Our Laminum Shims are good news for thousands of metal working plants, because our "NOs" save time and reduce costs.

LAMINATED SHIMS OF

LAMINUM®
SURFACE BONDED... THEY peel FOR ADJUSTMENT

And only in Laminum are laminated, surface-bonded shims available in all four materials as shown below.

Laminated Shims of LAMINUM now available in	STAINLESS STEEL with laminations of .002" or .003"	LOW CARBON STEEL with laminations of .002" or .003"
	BRASS with laminations of .002" or .003"	ALUMINUM with laminations of .003" only

LAMINATED SHIM COMPANY, INC.
Shim headquarters since 1913
3110 Union Street, Glenbrook, Conn.

absentmindedly reaching for the pencil. To do it once is perhaps understandable, but I have been fooled no less than three times. What a remarkable illusion!

John Benson
Palo Alto, Calif

Dear Sirs:
. . . I was, perhaps, the ten-thousandth person who tried to pick the pencil off the Tool Show Issue.

D L Jeka
Haynes Stellite Co
New York, NY

Dear Sirs:
. . . I don't think you can beat that for realism.

Robert A Wason III
Denham & Co
Detroit, Mich

Dear Sirs:
I think I've tried to pick up the pencil at least ten times. Am passing the magazine along so I can stop grabbing at nothing.

Frank O Klapp
Sterling Grinding Wheel Co
Tiffin, Ohio

Dear Sirs:
Perhaps it never occurred to you when you published this, but you would be surprised to know the number of people who have tried to pick up that pencil . . .

J F Enderlin
Illinois Central Shops
Paducah, Ky

Careful planning made the realism; the effect was intentional but not malicious. However, the response has been overwhelming— Ed.

Helpful Henry

by L. Hoppes

"I've taken on an assistant, boss. Poor old guy needed a job!"

CALENDAR

Society of Automotive Engineers —Summer Meeting, June 8-13, Chalfonte-Haddon Hall, Atlantic City, NJ.

National Materials Handling Exposition and concurrent ASME conference on Materials Handling, June 9-12, Public Auditorium, Cleveland, Ohio.

International Automation Congress & Exposition—June 9-13, Coliseum, New York, NY.

American Institute of Industrial Engineers — National Conference and Convention, June 12-13, Hotel Statler, Los Angeles, Calif.

American Society of Mechanical Engineers—Semi-Annual Meeting, June 15-19, Hotel Statler, Detroit, Mich.

American Society for Testing Materials—Annual Meeting and Exhibit, June 22-27, Statler Hotel, Boston, Mass.

National Tool & Die Manufacturers Association — Summer Meeting, July 23-26, Mt Washington Hotel, Bretton Woods, NH.

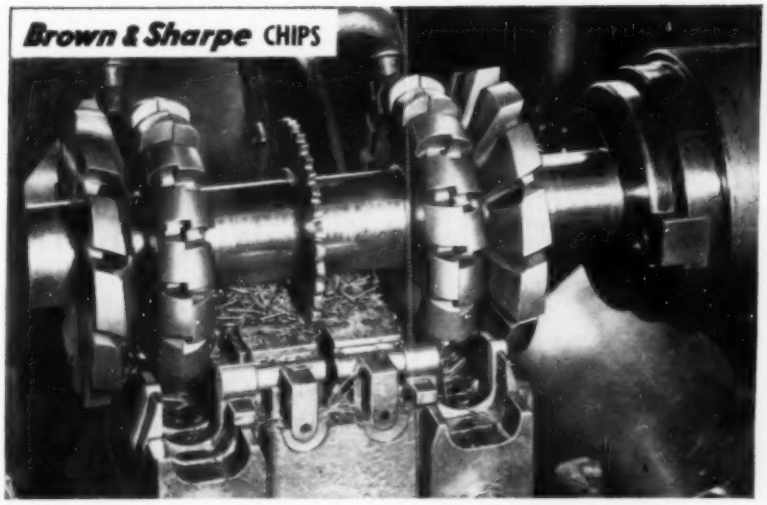
Society of Automotive Engineers —Farm, Construction, and Industry Machinery Production Forum and Display, Sept 8-11, Milwaukee, Auditorium, Milwaukee, Wis.

Instrument Society of America—Annual Instrument Automation Conference and Exhibit, Sept 15-19, Convention Hall, Philadelphia, Penna.

Society of Automotive Engineers —Aeronautic Meeting and Display, Sept 29-Oct 3, Ambassador Hotel, Los Angeles, Calif.

American Society of Tool Engineers — Semiannual Meeting and Western Tool Show, Sept 29-Oct 3, Shrine Exposition Hall and Statler Hotel, Los Angeles, Calif.

American Society of Mechanical Engineers and American Society of Lubrication Engineers —Lubrication Conference, Oct 14-16, Statler Hotel, Los Angeles, Calif.



Gang Cutters perform 5 Milling Cuts in 48 Seconds!

Dual Frame Forging Ready For Milling—Slitting Saw Separates 2 Parts.

Completed Brown & Sharpe Micrometer

Precision BS Cutters Produce Precision BS Micrometer Frames

Shearing action designed into these special Brown & Sharpe cutters gives a smooth, accurate finish on tough steel micrometer frame forgings.

Uniformity of product is vital... and positive, close tolerance milling is accomplished through experienced cutter development to produce fine surface finishes with no overheating, no piece distortion.

Angular-gash design of the outside form-relieved cutters quickly, precisely and economically mill outside contour. Two pairs of interlocked form-cutters (second from end) give smooth micrometer throat surface finish without chatter or scoring.

Even the cutter chips indicate the degree of precision built into B & S PRODUCTIONEERED cutters.

Call on the local Brown & Sharpe Cutter Engineer to trouble-shoot your production problems.

Write for 96 page Catalog 37C showing ove. 2500 High Speed Steel Tools and Accessories to: *Cutting Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.*

PROGRESS IN PRECISION FOR 125 YEARS

Brown & Sharpe

CUTTING TOOL DIVISION

NELCO CARBIDE TOOLS BS HIGH SPEED STEEL CUTTERS

PRECISION TOOLS AND GAGES • MILLING GRINDING AND SCREW MACHINES
MACHINE TOOL ACCESSORIES • PUMPS AND HYDRAULIC PRODUCTS

Shutdowns
for lubrication
cut in half
with

RYKON

Grease

Dollars in production time saved by using RYKON in high temperature service at Northwestern Steel & Wire Company

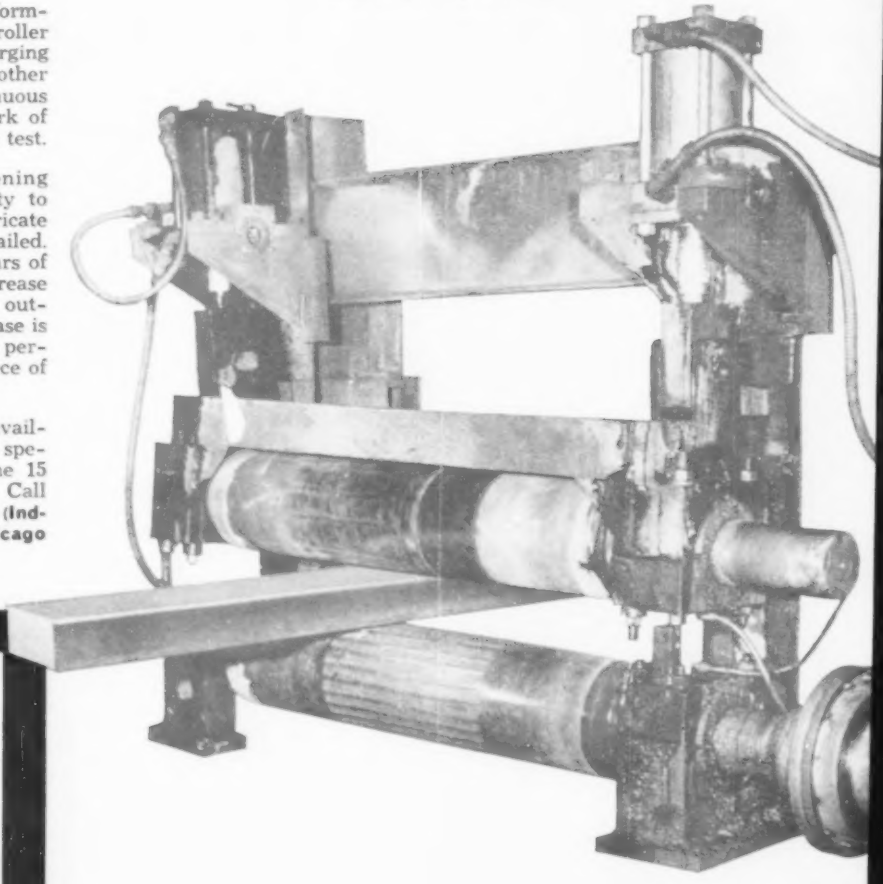
Bearings on the 46-inch blooming mill manipulator and side guard carrier had to be lubricated twice each eight-hour shift before RYKON Grease was used. The mill had to be shut down while the lubrication work was performed. Now with RYKON, the bearings are greased once each shift. Maintenance men find rollers and pins are still well lubricated. The rollers are subject to almost constant heat and water washing. Steel blooms heated to approximately 2300° F. are just 18 inches away from the RYKON lubricated bearings. The lubricating properties of the grease are unaffected by the heat.

RYKON Grease delivers similar performance results elsewhere in the plant. In roller bearings on the reheating furnace charging tables, in pinch roll bearings and in other trouble spots, where heat and continuous water washing would make short work of other greases, RYKON stands up to the test.

A unique nonsoap, organic thickening agent gives RYKON Grease the ability to provide lubrication in tough-to-lubricate spots long after other greases have failed. This thickener is the result of five years of research effort by a Standard Oil grease research team working to develop an outstanding industrial grease. RYKON Grease is a true multipurpose grease capable of performing all lubrication jobs on one piece of equipment or often in an entire plant.

More facts about RYKON Grease are available from the Standard Oil lubrication specialist that is near you in any of the 15 Midwest and Rocky Mountain states. Call him. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Bloom in the pinch roll. A 2300° F. bloom goes through while water washes continuously. RYKON Grease keeps this equipment lubricated at all times in spite of heat.

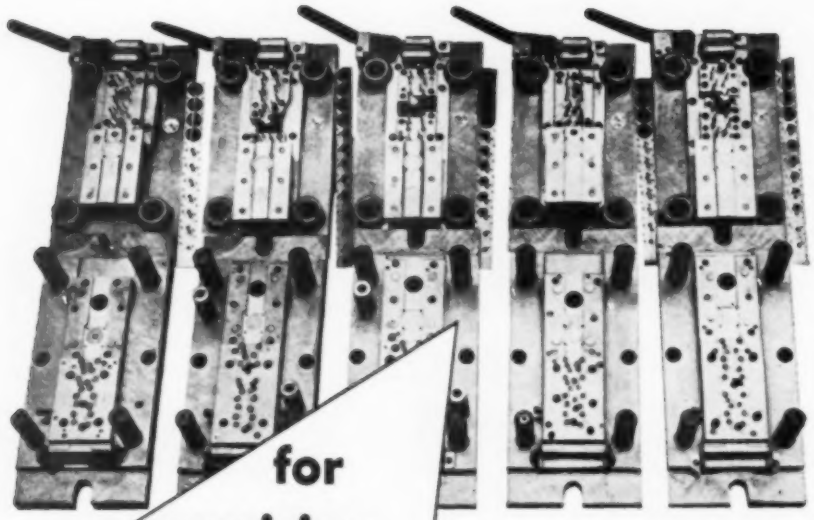


Quick facts about
RYKON Grease

- Stable at high temperatures. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust preventive properties.

You expect more from STANDARD and get it!

Lubrication time cut. Mill feeder pinch roll bearings formerly lubricated twice each eight hours. Now with RYKON Grease lubrication is needed only once each shift. Elbert Dean, Northwestern Steel lubrication engineer, and Standard Oil lubrication specialist, Charles Daub, inspect bearings. Counseling people who have lubrication jobs like this is work for which Chuck Daub is well-qualified. Chuck has 12 years' experience in lubrication technical service work. He has an engineering degree from Illinois Institute of Technology and has completed the fifteen week Standard Oil Sales Engineering School course.



for precision jobs like this....Moore Jig Borers and Jig Grinders are "MADE TO ORDER"

NO. 2 MOORE JIG BORER. Range 10" x 16" x 16" height. Features infinitely variable spindle speeds, three power feed ratios, centralized controls.

NO. 2 MOORE JIG GRINDER. Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up or down; spindle-housing heat control; features slot grinding attachment.

"HOLES, CONTOURS AND SURFACES

is bound to become a classic to the man or shop that does accurate work."

American Machinist Book Review

424 pages—$5 U.S.A., $6 elsewhere

Moore Jig Borers and Jig Grinders are made to order for jobs that require precision hole location—and plenty of it.

Take, for example, these five progressive compound dies used to pierce, shave, gut and blank intricate timing-device parts.

Holes in punch plate and stripper were jig bored in a No. 2 Moore Jig Borer. Holes in the corresponding die parts were jig bored in the same precision machine, hardened and then jig ground in a No. 2 Moore Jig Grinder. Perfect line-up was insured, since all holes had to be held to ± .0002", both for position and hole size.

The No. 2 Moore Jig Borer, with its built-in system of accurate lead screws, can spot, drill, bore or ream all holes in a workpiece to "tenths" with minimum tool changes. The No. 2 Moore Jig Grinder can accurately contour grind, slot grind and form grind die sections in a third of the time required by other means.

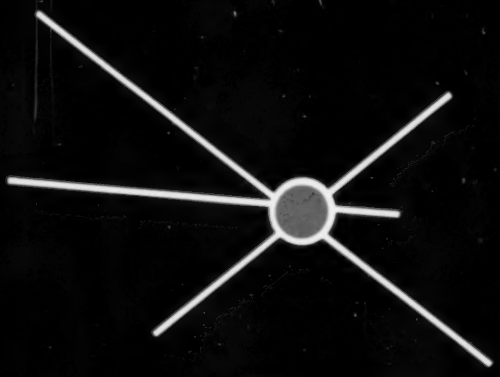
These Moore toolroom teammates provide a one-two punch that can knock the fat off your diemaking costs. They supply an *Engineered Hole Location Service* that permits tool and die sections to be produced concurrently...puts diemaking on an interchangeable-parts-and-assembly basis...lengthens die life...*saves you time and money* all along the line.

Write today for our detailed literature that pictures and describes many toolroom and production jobs for which Moore Jig Borers and Jig Grinders are made to order.

MOORE SPECIAL TOOL COMPANY, INC.
738 Union Ave., Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS · JIG GRINDERS · PANTO-CRUSH WHEEL DRESSERS · DIE FLIPPERS · MOTORIZED CENTERS · HOLE LOCATION ACCESSORIES

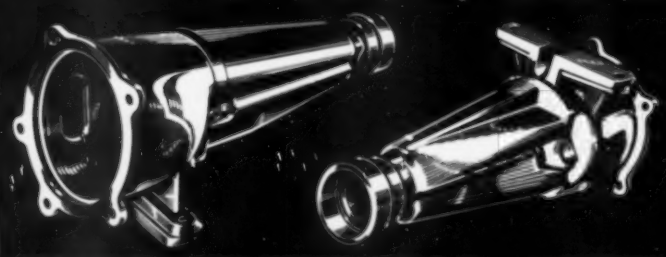


BUHR

the symbol of
quality in
multiple purpose
high production
equipment . . . . .

60 operations on 170 aluminum castings per hour

- Includes assembling, post-assembly boring and gaging, and part spinning on the inserted bearing for flange facing
- Building-block principles used throughout
- Static units used throughout control of machine
- Machine condition exhibited at all times on lighted monitor panel duplicating machine floor plan

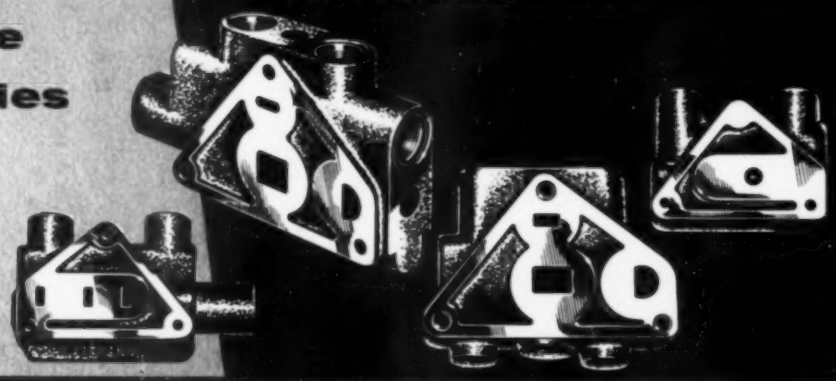


6 earth moving machinery parts

- Selective automated processing of 6 different parts
- Six to eight operations per part in 9 to 13 minutes—including straddle and hollow milling
- Any of 20 different stations available in 90-inch travel
- Change-over by setting selector switch, tool changes (as required) and work holding fixtures

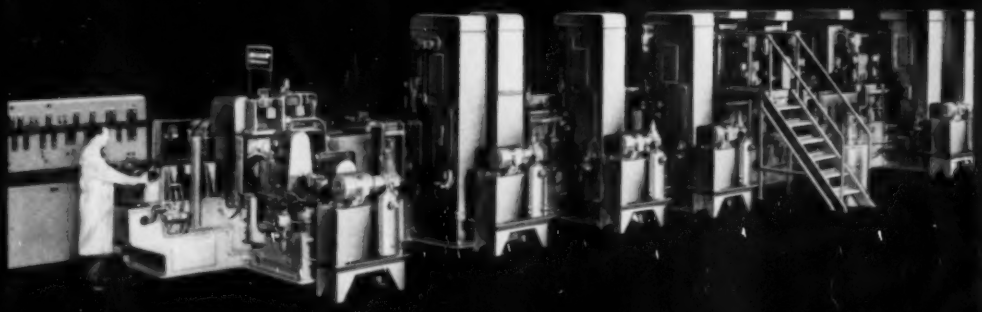
36 different hydraulic valve bodies

- Change-over speeded by partially automated setup and simplified tool changes
- From 19 to 37 operations per part
- Interlocks protect parts, machine and operator
- Average output more than one part per minute regardless of part being machined

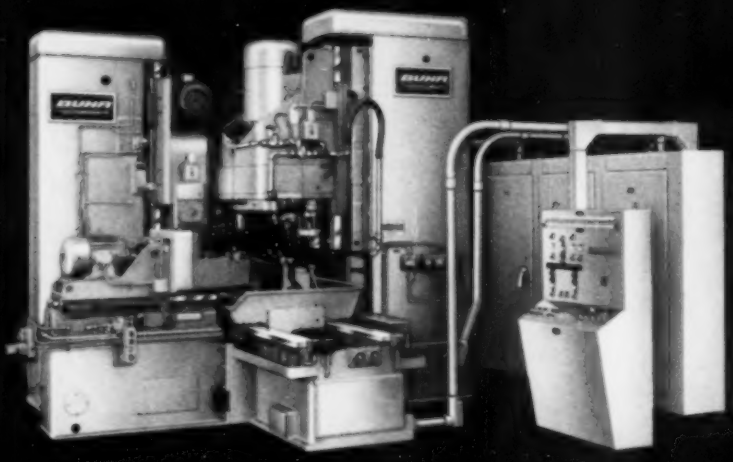


BUHR

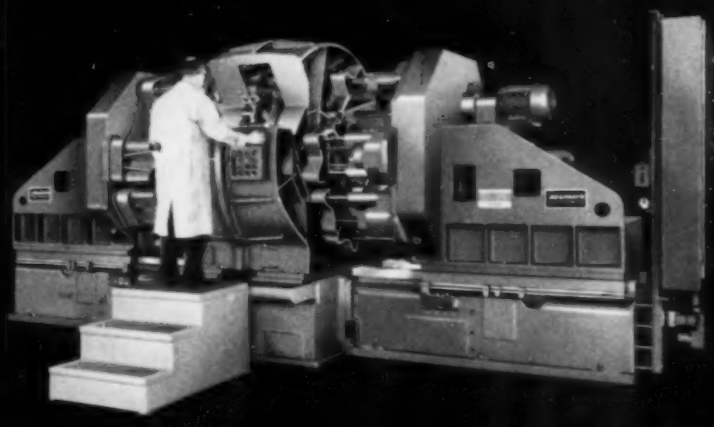
ANN ARBOR, MICHIGAN



transfer
type



shuttle
type



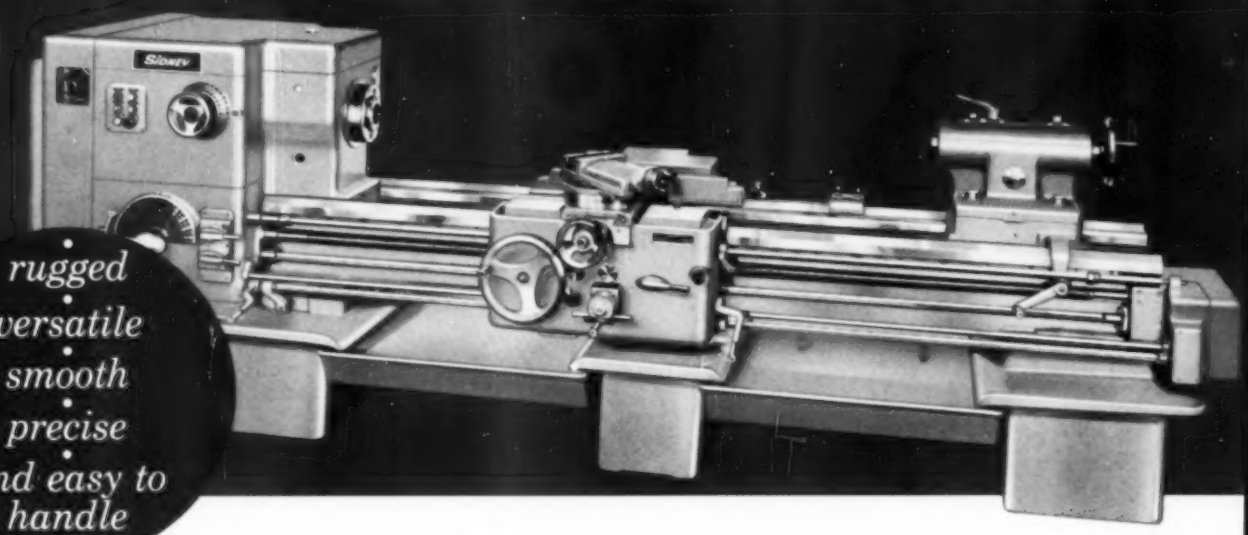
trunnion
type

. . . three more examples

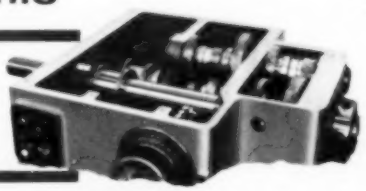
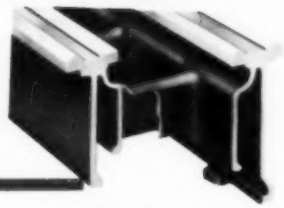
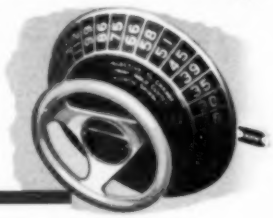
BUHR ECONOMATIC

MACHINE TOOL COMPANY

The lathe with plus values all the way through



rugged · versatile · smooth · precise · and easy to handle

when you're looking for	you'll want to look for this	
smoothness	Does the headstock have quiet constant mesh gears —herringbone gears preferably? Only Sidney lathes do.	
rigidity and accuracy	Is the bed of multiple wall construction and is full width leg mounting used? You'll find both only on Sidneys.	
ease of operation and versatility	Can you pre-select 32 or more speeds easily? Are speed changes in *true* geometric progression? Do you shift clutches instead of gears? They're SIDNEY features.	
low maintenance long life	Is automatic lubrication provided throughout? Are the apron and tailstock thoroughly protected against entry of foreign matter? Are anti-friction bearings used on all shafts? Can you get chips out fast? Are the bearings big and husky? On Sidneys they are, for sure.	

SIDNEY

SIDNEY MACHINE TOOL CO.
SIDNEY, OHIO
Wholly owned subsidiary of Buhr Machine Tool Co.

SPOT NEWS...

- **The 1959 Ford will have an all-new automatic transmission** to replace its Borg-Warner-based "Fordomatic." It will be a two-speed torque converter unit of greatly simplified design. Ford's higher-cost, three-speed "Cruisomatic" will be continued as an option.
- **Improved copper plating technique,** for use under chrome plate on auto trim, gives better corrosion resistance and the same bright finish at lower cost, according to DuPont. "Leveled copper process" smoothes out surface of drawn and polished steel parts so nickel and chrome plating can follow immediately. Buffing, cleaning and handling are eliminated.
- **British hot spinning process forms ends of tubes 2½ times as fast,** and much cheaper, than conventional methods, according to its developer, British Oxygen Gases Ltd. Wall thickness variation is held to 0.0015 in.
- **Detroit tool and die manufacturers are sweating out a strike threat** of their own —a walkout that could tie up work on new auto models and affect the whole auto industry. Two key UAW locals have served notice on the Automotive Tool & Die Manufacturers' Association, a group of 128 Detroit-area shops.
- **Chemical process for hardening sand cores and molds,** shown at the recent Foundry Congress, uses carbon dioxide to do the job in seconds by freezing the sand into a solid mass. Baking is eliminated, method is much cheaper, tolerances can be achieved to within a few thousandths, machining time is cut as much as 80%.
- **Somebody finally got around to counting the parts in a modern car.** The 1958 Chevrolet Biscayne has 13,512—4007 in the body, 9505 in the chassis and engine.
- **High-frequency (450,000 cps) induction welding technique** butt welds 7-in. gas pipe in 1½ min instead of the usual 60 to 75 min with manual arc welding. Its developer, New Rochelle (N Y) Tool Corp, plans to branch out into larger and smaller diameters, claims T-welds are as easy as butt welds.
- **Entire operation of a large forge and press shop can be controlled by one man** from one panel in a new Russian-devised system. Entire shop process is reproduced on a screen, and counters show operating time of each unit, and how each operation is proceeding. Photoelectric device automatically records temperature of ingots from beginning to end. Film projections compare actual operating conditions with those required at any given moment, and any discrepancies can instantly be noted and corrected from the panel.
- **Soviet Russia will display complete line of instruments** and automatic control equipment for pressure, temperature, flow, liquid level, etc. at Automation Exposition at New York Coliseum June 9 to 13.
- **Trade barriers will be let down on shipment of critical machine tools** and other equipment by our allies to Communist countries. Recent sessions of Cocom in Paris are expected to result in a more liberal scheme being ready by late July. Japan, United Kingdom and France have pushed for revision. United States probably will retain its own restrictions indefinitely.
- **Four-fifths of Russia's production increase from now to 1965** will come from improved labor productivity, chairman of USSR State Planning Commission claims. He states that Russia will have built 1400 automatic transfer machines by then, if present plans are fulfilled.

Spot index to major News stories...

17 Firms Set Up Optimum Machining Lab 83
Russian Tools at Brussels Fair 92
Timken Breaks the "Hot Box" Barrier 94
Straight Line Locomotive Output 96

Washington 67
Detroit 69
Aircraft & Missiles 71
Machine Tools 73
Materials 75

What's Ahead
in Metalworking 77
in Business 78
Field Report 138
Names in the News 147

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WASHINGTON...

Research...

. . . and development in the last 10 years has become a major form of capital outlay, a top level group of businessmen was told at a conference sponsored by the National Science Foundation.

In fact, more was invested in research in 1957 than was invested in either new plant or new equipment by manufacturers, according to one expert.

According to National Science Foundation figures just made available from a survey of thousands of firms in 30 major industrial groups, total R & D expenditures hit $9 billion in 1956—an increase of 67% from 1953, the last year that was surveyed.

Industry-financed research hit $3.3 billion, an increase of 44% from '53; federal-financed R & D hit $3.1 billion, up 131% over 1953 figures.

Biggest R & D...

. . . expenditures centered in 13 industries which performed 85% ($6.5 billion) of industry's 1956 research spending. 'Way out in front are the aircraft and aircraft parts industries with 32% of the total. Next come electrical equipment makers, at 18%; machinery firms, 9%; chemicals, 8%; petroleum, 4%; and professional scientific equipment, 4%.

Questionnaires are out now seeking the same information on those firms' R & D expenditures last year—and asking for the first time, information on the numbers and types of scientists and engineers they employ.

In this connection, Dr C Guy Suits, research director of General Electric, warned against going overboard on the question of the shortage of scientists and engineers. He noted that "the supply of both categories appears to be quite adequate," and "a little stretch may be required" to place this year's graduates.

Defense compromise...

The Pentagon will have a new Research & Engineering "Czar" under the Defense Reorganization Bill approved by the House Armed Services Committee. His title: Director of Defense R & E. His functions: to supervise all military research & engineering projects (which the individual services will continue to conduct), and to direct such projects which he believes require centralized management.

In effect, the roles of the Services in R & E are down-graded and more centralized control for all weapon development will be established—comparable to the centralized supervision now governing space and missile projects.

The R & E provision is the least controversial feature in the very controversial Defense Reorganization Bill. As approved by the House committee, the bill as a whole is pretty much of a compromise of the administration's broad proposal for more centralized powers for the Secretary of Defense and reduced authorities for the individual Services.

Congress studies prices...

Price cutting has been a lot more common during the recession than businessmen like to admit, and it is not fully reflected in the official government price indexes.

That's the conclusion presented to a Congressional committee making a broad study of the role of prices in the business picture.

Steel, oil, and autos were cited as three typical industries in which price competition actually is especially keen, even though officially quoted prices remain stable.

The BLS Price Index was severely criticized by one economist for failure to reflect the full extent of price reductions. The indexes for both consumer and wholesale prices show only minor reductions since the start of the recession.

A tax cut decision...

. . . will come "soon," Eisenhower keeps saying. The first decision should be on corporation income tax rates and excises, which automatically drop July 1 unless extended. The administration said in January it wanted all these rates maintained. It will probably repeat the request, despite widespread discussion about possible lowering of auto and freight excises.

The administration will also have to decide in the next few weeks whether to recommend more liberal depreciation allowances for tax purposes. Many officials are for liberalization, but they're afraid to make the move for fear Congress will insist on adding a cut in personal income taxes as well. This fear may kill depreciation relief.

The showdown on a broad general tax cut, with something for both business and individuals, could be postponed until late this summer.

There may be no really final decision one way or the other until the last days before Congress goes home—that is, as late as mid-August.

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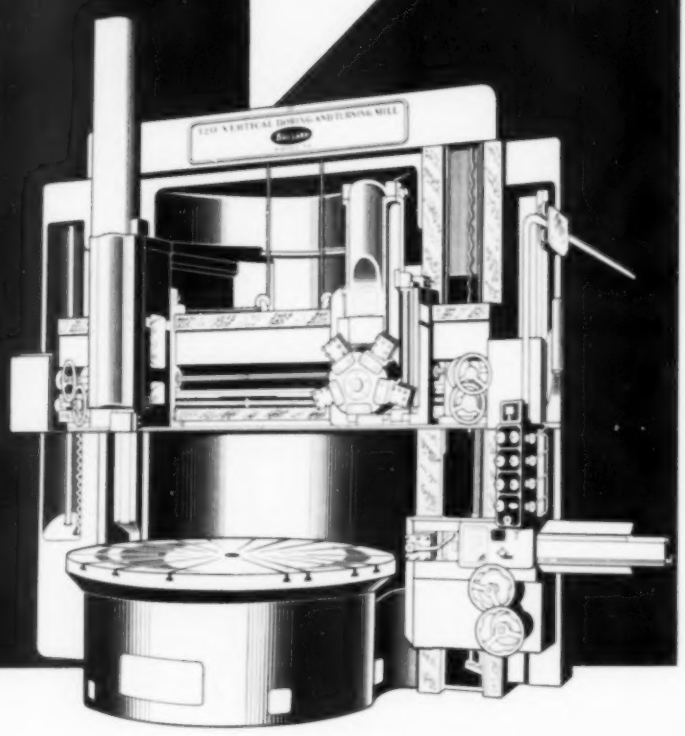

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BRIDGEPORT 2, CONNECTICUT

DETROIT...

An idle summer...

Many auto workers will have little but fishing to look forward to during July. Buick's big Flint plant may be the first to shut down for changeover late in June. It will be followed closely by the chain of B-O-P assembly plants across the country, and operations will not resume until August. A similar pattern will be followed by Chrysler.

The closing of Ford, American Motors, and plants of the stronger GM division will follow a more nearly normal pattern in August. Introduction of every 1959 make except Ford and Rambler will cluster around the first two weeks of September.

Despite public predictions of a six-million-car year in 1959, automakers show every indication of caution in the preliminary scheduling of new model production. However, no clean-up problem is expected. Dealers will enter the period with less than 700,000 cars on hand.

Also problematical at press time was the direction, if any, that the stalemated auto negotiations would take. The mechanics for working without a contract have been agreed upon, so it is assumed that talks will stretch well beyond the end-of-May deadlines. Union spokesmen say that no one will "force" them to strike. Auto companies are adamant in offering no more than two year extensions of present contracts.

Reuther, of course, would like to stretch pointless dickering on into model changeover time to give him at least one club in hand. Veteran observers are flabbergasted at the strange quiet, but warn that this sometimes precedes a tornado.

Worm's eyeview...

If ostriches were native to Detroit, they would be amazed to find the sands crowded with auto executive heads hiding from reporters who want to know what's with the American-made small cars. Any minor civic group that wants a speaker to come down and minimize the possibility need only to call the home office of Ford, GM or Chrysler. The man will spend 15 minutes defending the current Detroit product, two minutes noting that "We are studying the small car potential," ad the remaining time in disassociating the auto industry from the recession.

Granted, the point of no return has not been reached, but the green light is on at Ford and Chevrolet. Toolmakers bidding on the GM project are working their mathematics overtime, so great is the pressure.

Meanwhile, a few more stray bits of information emerge. The horizontally-opposed, rear-mounted and air-cooled Chevrolet six will displace 183 cu in. Chevrolet engineers can probably extract upwards of 95 hp from this. The car itself will have a silhouette strongly reminiscent of the current Renault Dauphine, except in size. Several are running daily at the GM proving ground, contrary to published reports that none actually exist.

New truck axle...

Standard Oil Co of Ohio is experimenting with an unusual new "center-line steering" truck axle that has excited Detroit truck makers.

Test results show that a tanker so equipped, and with 15,000-lb load on the front axle, steers more easily than the same vehicle with 10,000-lb load and a power-steered conventional axle.

In the new wheel design, the hub is stationary and the spindle rotates. No king pins are used. The term "center-line" comes from the zero camber and toe-in settings. Two degrees rearward castor is specified. The design is adaptable to passenger cars.

Don't believe it...

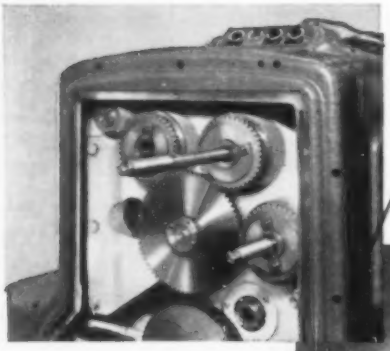
A poll recently taken by Elmo Roper has caused consternation in Detroit. According to the survey, only 38% of Americans thought that the annual model change was a good idea while 50% thought it was not, and 12 % had no opinion. Objection to the practice grew slightly with decrease in the respondent's income.

Parking problems...

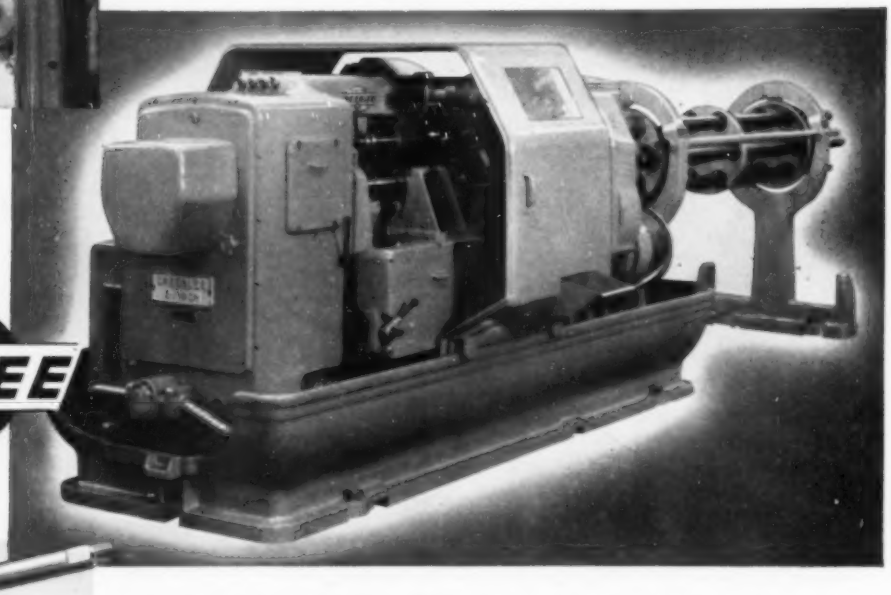
The average of eight biggest selling American cars has grown 18.2 in. longer and 6.8 in. wider in the past 20 years, according to an unbiased (sic) survey made by American Motors. The trend is still up. Some makes will be from two to four inches longer in 1959 and others will add a comparable length in 1960.

Eighteen cities were queried, and 11 of these have had to lengthen parking meter spaces in the past few years. It cost about $13 per meter to do this, not to mention loss of meter revenue.

Parking lot operators note that a lot that would hold 100 cars 10 years ago today will hold only 70. Many operators are discussing charging more for large cars. Land in large cities can run up to $100 a square foot. That means $18,000 of real estate to park one standard-sized car.



GREENLEE LEAD-SCREW FEED ASSURES *Precision* THREADING and TAPPING



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The Greenlee precision lead-screw threading arrangement makes it easy to machine parts otherwise impractical on an automatic bar machine. Precision Acme, tapered and multi-lead threads are machined in the high speed and feed ranges required. Smooth, clean thread form, fine fit and high tolerance concentricity make lead-screw threading profitable. Built-In Duplex clutches on 6-spindle machines reduce set-up time on simultaneous tapping and multi-tooled jobs. The profitable lead-screw arrangement can be applied to Greenlee machines in the field as well as on new Greenlee Automatics. It will pay you to investigate.

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AIRCRAFT and MISSILES... TRENDS

California subs optimistic...

At the moment, Southern California's aircraft and missile business offers little more than hope for better things to come.

But that hope is widespread among subcontractors. Almost all of them are optimistic about the future, and some of the bigger subs are even in the process of tooling up in anticipation of a business pickup.

But small machine shops continue to go out of business daily, unable to hold out until things get better. And the size of shop that is folding keeps getting bigger.

Stretchouts and cutbacks were first felt by the one- or two-man shop, but now some 20-man shops are closing their doors.

Auctions of plant and equipment are still frequent on the West Coast, and in a typical week there may be as many as two a day.

Among the shops still operating the feeling prevails that the day of increased production orders is not far off—maybe by fall.

New Jupiter IRBM cuts?

The on-again, off-again Jupiter IRBM Project is once more under study at the Pentagon. The Air Force, which now has operational responsibility over the Army-developed missile, has been anxious to cancel the project. It claims that the project's continued existence—along with its own Thor IRBM—duplicates production costs, complicates logistics, and increases training and base construction requirements.

Defense Secretary McElroy has been reluctant to kill the Jupiter program, feels that since neither Thor nor Jupiter have completed evaluation tests, both missiles should be continued in pilot production. Plans are to set up at least three Jupiter IRBM squadrons in Europe and about ten Thor units.

But McElroy is now seriously considering an Air Force proposal to boost output of the Thor (major contractors: Douglas, North American Aviation, GM's AC Sparkplug Division) and reduce production schedules on Jupiter (Chrysler, NAA, Ford Instrument).

Despite all the recent hullaballoo over putting Jupiter into production last fall, McElroy now concedes that Chrysler still hasn't been authorized to set up a full production line. Major pilot production has been under way at the Army's Redstone Arsenal. Chrysler has been in only limited production of parts.

Atomic rocket stepup...

The Atomic Energy Commission plans a speed-up in its program to develop nuclear-powered rockets. The bulk of the research work is performed at AEC facilities. The plans include an estimated $20 million for construction of nuclear rocket and ram-jet test facilities.

AEC has three known projects in this field—Project Pluto to develop a nuclear ram-jet engine to propel space vehicles; Project Rover to develop an atomic rocket motor; and Project Snap to develop an auxiliary atomic engine as a power source for reconnaissance satellites.

New Navy carrier bomber...

North American Aviation's Columbus (Ohio) Division has rolled out the first prototype model of the Navy A3J attack aircraft—the most advanced Navy carrier bomber.

The plane is lighter than existing attack aircraft operating off carrier vessels, will fly Mach 2 speeds. The all-weather plane is powered by two GE J79-2 engines, producing over 24,000 lbs. of thrust—similar to the engines which power the Regulus 2 missile, the B-58 medium-range bomber, and F-104 fighter plane.

Production models of the A3J are expected to cost $8 million each—roughly the same as for a B-52 bomber. The plane is North American Aviation's first "weapon system management" project—the company having responsibility for development and production of the entire weapon.

Only one strike on Coast...

Despite strike threats that hung over most major West Coast aircraft manufacturers in May, only one actually materialized—at Convair's Pomona, Calif, plant where 1777 IAM members out of a total 4400 workers "hit the bricks."

But the strike was a violent one, so much so that Convair filed an injunction suit against IAM, asking $50,000 damages daily as long as the strike continued.

The Pomona strike came in the face of acceptances by other IAM and UAW workers of new contracts with Douglas, North American, Lockheed, and even other Convair plants. The main point of disagreement: seniority terms.

Meanwhile, Rheem Mfg Co's Downey, Calif, Aircraft Division was threatened with a strike by 1500 United Steelworkers employees.

They too are dissatisfied with seniority and transfer provisions of their new contract.

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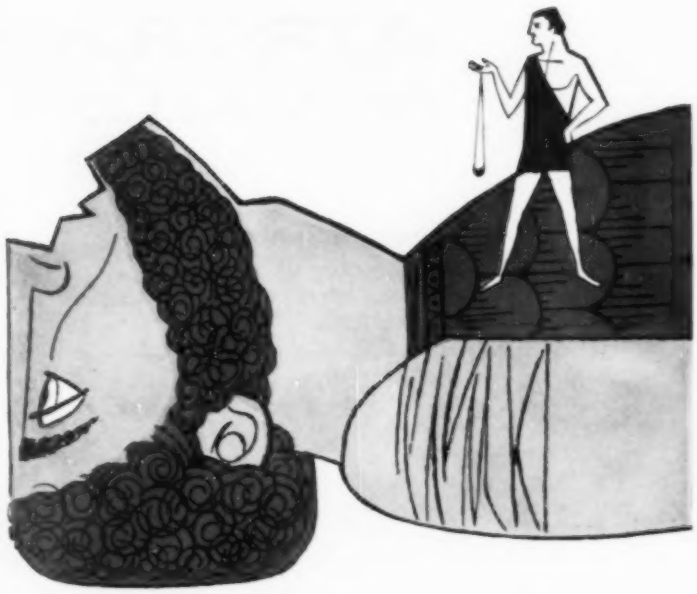

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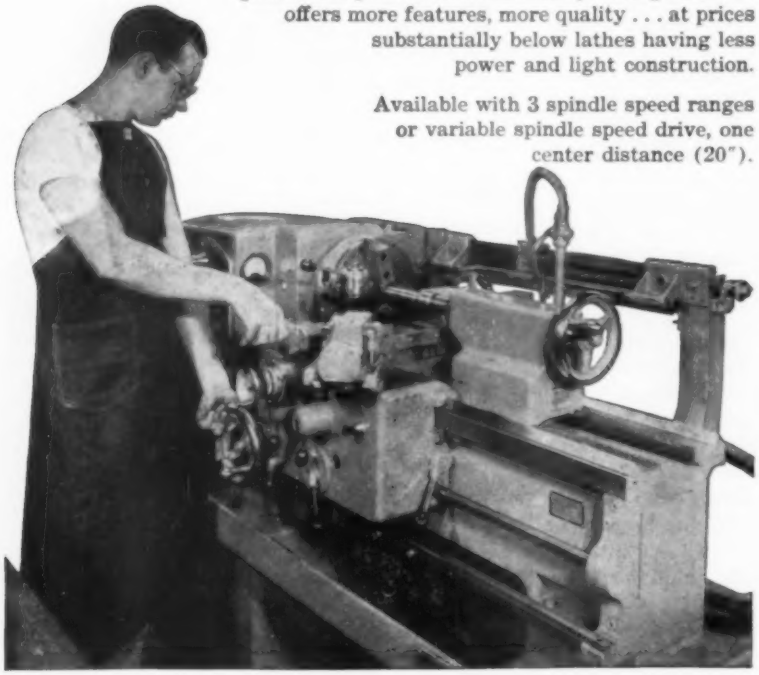

"EXCELLENT FOR HIGH PRODUCTION ON SMALL PARTS," says Indiana Gear Works, Indianapolis

This well-known precision gear manufacturer has a number of Lodge & Shipley lathes in a busy plant. The latest is a Hi-Turn COPYMATIC, evaluated as follows:

SPEED RANGE:
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FEED RANGE:
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DINABRAKE MOTOR:
"Speeds production."

HP AMMETER:
"Enables the operator to run the machine at full capacity."

DESIGN:
"Compact, provides ease of set-up."

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"Good."

For complete details, request Bulletin DM-4 from:

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MACHINE TOOLS...

Tooling orders for small car...

Some machine tool orders already have been placed for the new small car to be marketed by General Motors. Chevrolet, which is reported in charge of the project, is asking for December delivery.

It seems obvious that General Motors does not intend to wait for the 1960 model year to roll around to introduce the new car. Evidence points to a date as early in 1959 as possible.

The whole project has all the earmarks of being in the "trial-balloon" category. The new car almost surely will not have the Chevrolet nameplate. A new name probably will be devised.

There is no intention of producing the car in big volume at the beginning. The engine line is tagged for 70 units an hour. Should the car catch on in a big way, further capacity will be added.

Chevrolet seems to be doing its best to keep the details of the new car under wraps. It is letting suppliers know as little as possible about the overall program.

The new car will be the experiment ground for the "trans-axle", which, as already reported in this column, will be turned out at Chevrolet's Toledo, Ohio, plant.

Tooling for the small car will be done as economically as possible. Wherever Chevrolet can find existing equipment that can be rebuilt, it is sending it back to the original builder to be retooled for the new job. Nevertheless a sizable investment will be made in new machines too.

General Motors is not yet convinced that there is much of a market on a permanent basis for small cars in this country. It is moving to protect its own position, however, by developing the new car.

New Britain sets up French subsidiary

New Britain Machine Co has set up a French subsidiary where it plans to build several models of its screw machines and chucking machines. The subsidiary, owned 70% by New Britain, is Machine Outils Automatiques New-Britain, Division of Amtec-France, 252 Rue Francis de Pressense, Lyon, Rhone, France. George Lopato is president, with headquarters in Paris.

Facilities at Lyon, including plant and office, cover 36,000 sq ft. The plant formerly produced machine tools under the name Marcel-Pegard. New Britain has been building machine tools in France under subcontract since 1952, but this contract has been terminated and all production hereafter will be in the new facilities at Lyon.

The movement by US builders toward establishing some kind of manufacturing arrangements in Europe still is in full swing. At least two prominent builders are expected to begin soon their own production operations in England or on the Continent. Two other builders are actively negotiating to have their machines made under license by British companies.

Navy to place large orders...

April net new orders for cutting-type machine tools were at the identical level as in February—$22.8 million. The volume was down some $6.5 million from March.

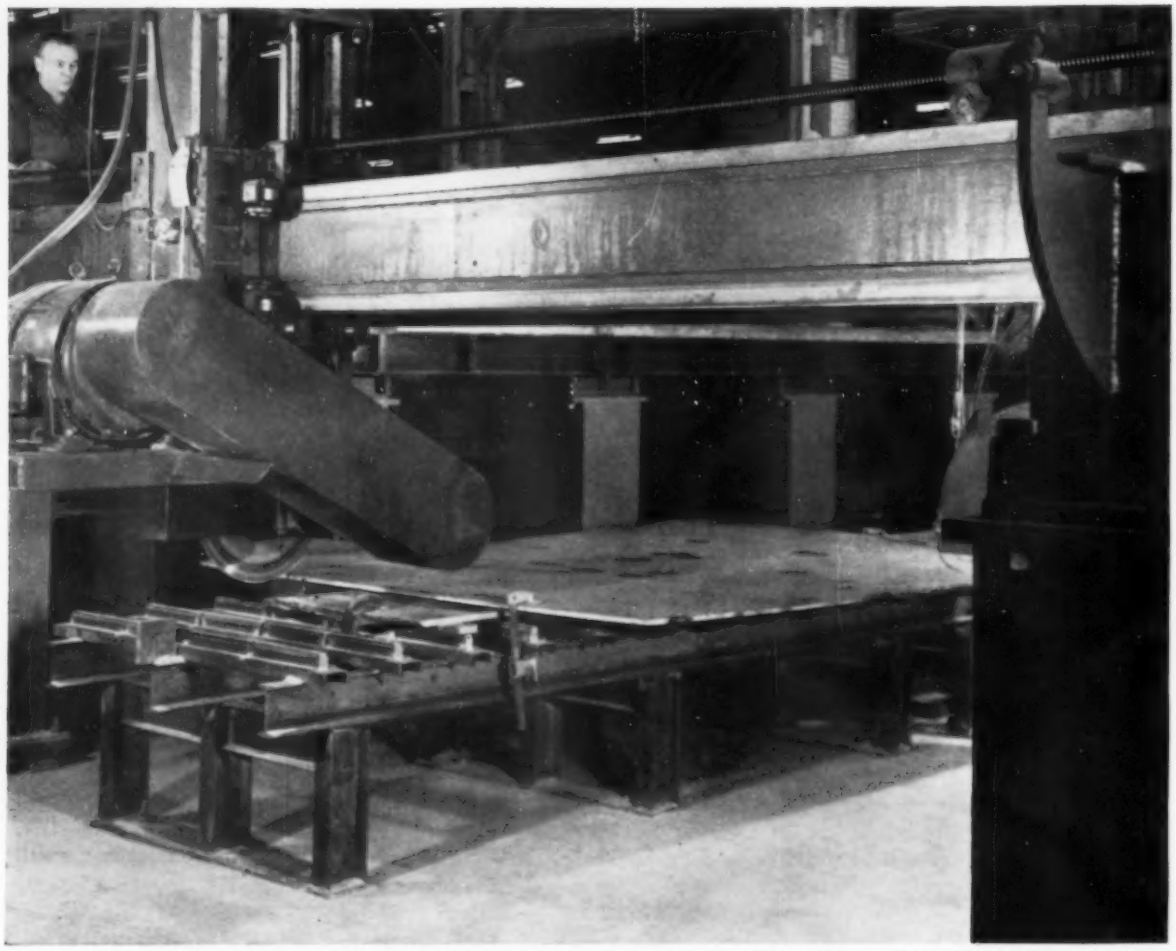
May probably was no better than April. But June may get a lift from Navy purchases as fiscal 1958 comes to an end. However, much of the $16 million to be placed by the Navy is said to be for forming and shaping machines.

Navy is attempting to trade in old machines for new in this replacement buying program. It is anyone's guess what influence the trade-ins will have on allotments of orders.

A large steel company has ordered machine tools estimated at $3 million. Its representatives declare that its purchases would have been twice that amount if it could have depreciated the machines within five years.

BF

NET NEW ORDERS for metalcutting and metalforming machine tools reverted to February levels in April, declining to $28.25 million from March's $36.15 million. During the same period, shipments dropped from $54.15 million to $51.2 million, and backlogs declined from 2.7 to 2.6 months



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TRENDS

MATERIALS...

New crystal structures...

. . . for brass, copper, and iron result from extremely high compression according to recent findings at the University of Chicago. Researching the subject in conjunction with a team from Los Alamos Scientific Laboratory, New Mexico, Cyril S Smith, Professor of Metallurgy in Chicago's Institute for Basic Research, said that explosions with shaped charges produced shock pressures of almost 9 million psi and caused characteristic changes in the crystal structures of brass, copper, and iron.

A structure known as twinning, in which two parts of a crystal are rotated 180°, has not previously been produced in copper at room temperatures. Shock waves traveling through the sample left behind them metal that was hardened more than that produced by cold rolling to 95% reduction, yet *without the accompanying change in the metal's dimensions.*

Shock waves are offering a whole new area of energy application, particularly in terms of the effect they have on the crystal structures of materials. Applications to date have included punching, forming, cutting, and welding. Now, with the help of X-ray diffraction and microscopy, they are seen to cause unusual hardening.

At last, a durable red...

. . . pigment has been developed for metalfinishing and will soon be supplied by a new production unit set up by E I duPont de Nemours at Newport, Del. Called "Monastral", this new family of pigments is claimed to have excellent lightfastness, brilliance, bleed resistance, chemical inertness, heat stability, and working properties. A wide range of desirable shades will be available for auto finishes, plastics, textiles, inks, and paints. First use: probably for autos.

Can controversy...

. . . is waxing hotter and hotter as aluminum pushes harder and harder to replace some of the business that used 42 billion steel cans during 1957—and took 4,600,000 tons of steel to make them. Of this total tonnage, food cans took more than 82%; the oil industry used approximately 6%, which is the largest non-food can application.

Total capacity of the entire aluminum industry is not adequate at present to take over completely the position of the steel industry in can-making alone—nor is it expected to. But extensive market research by Arthur D Little, Inc, Cambridge, Mass, indicates that aluminum should capture approximately 5% of the can market within 5 years; then as much as 20% of the entire industry within 10 years. These are impressive figures, indicating a tremendous increase in the penetration of aluminum. But there are some hurdles ahead.

First, and most important, is the basic cost of aluminum itself. Currently, a typical fabricated aluminum can would cost from 10 to 20% more than a similar steel can. Also, even a slightly thicker aluminum-can wall will not take the abuse absorbed by a steel can and certain products cause corrosion and possible container failure in aluminum.

Advantages, on the other hand, include a sizable weight saving (hence lower shipping costs), an excellent base metal for decorating and design, the tremendous range of sizes and styles that can be made by "impact extrusion" and "deep drawing," and, paradoxically, the ability of aluminum to contain certain products better than steel or tinplate. In addition, new can-making techniques for aluminum lend themselves to smaller installations and less capital investment. And the cost of aluminum has not risen as rapidly, during the years since the war, as the cost of steel.

According to R J Siebert of Crown Cork & Seal Co, Inc, who gave these facts in a talk before the National Petroleum Association, aluminum will gain a permanent and substantial place in the rigid container industry. Aluminum sheets can be used, with minor modifications, in the machines which now produce 95% of the cans manufactured from steel sheets. But the cans must be cemented; they can't be soldered. This is not the best way to use aluminum, although it is fairly common now.

The real sleeper is impact extrusion and, combined with new lithographing techniques, it offers greatly increased possibilities for special designs and unusual can shapes. It also opens up a sizable potential market for capital equipment and tooling. And the use of aluminum will make scrap recovery (of used cans) much more valuable than it is for steel.

Only time will tell how the business will be divided. Meanwhile suppliers of both materials are pushing their research effort for new materials and new processes to overcome competitive advantages. With the bright outlook for the container industry, there is little doubt that both steel and aluminum will find healthy markets.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

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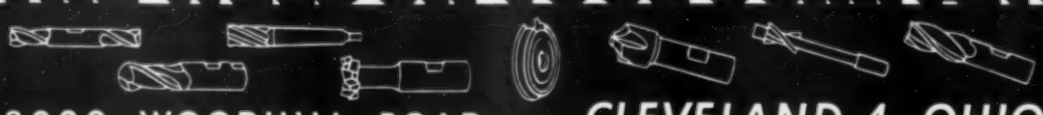

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WHAT'S AHEAD... in Metalworking

TRENDS

Signs of stability in Metalworking...

Metalworking production leveled off in May just one point below April's 148 figure on the American Machinist Index (see chart below).

But an even more significant indication that metalworking's recent downtrend is tapering off lies in production reports of the various segments of Metalworking.

Machinery, electrical machinery and "other Metalworking" industries were at last report stabilizing production close to March-April levels, and transportation industries, other than automotive, continued their upward climb.

Darkest spot in the Metalworking picture continued to be the auto industry.

But automotive parts makers report that the industry has now stabilized its production schedules as work on 1958 models phases out.

While employment is down about 33-35% in most auto parts makers' plants, those who are still working are putting in solid 40-hour weeks.

Orders for heavy trucks have improved noticeably in recent weeks, possibly a six-weeks' overdue spring upsurge.

Farm equipment sales, too, have picked up substantially in the last few weeks. Even though most producers chalked up first-quarter declines from 1957 totals, it now looks as though they will show first half sales totals well ahead of comparable 1957.

Largest gains are reported in harvesting machines, with some pickup in tractor output.

Construction machinery builders continue to mark time—waiting for the government's highly touted roadbuilding program to get going.

Tool and die industry production has shown a "creeping improvement" since November, which industry people regard as an indicator that manufacturing generally will pick up in the fall.

Improvement may have resulted because customers have been living off inventories for six months, now are forced to replenish them.

Same thing is true of the stamping field, where customers have scraped the bottom of inventories, but instead of starting full-scale replacement, they're buying hand to mouth.

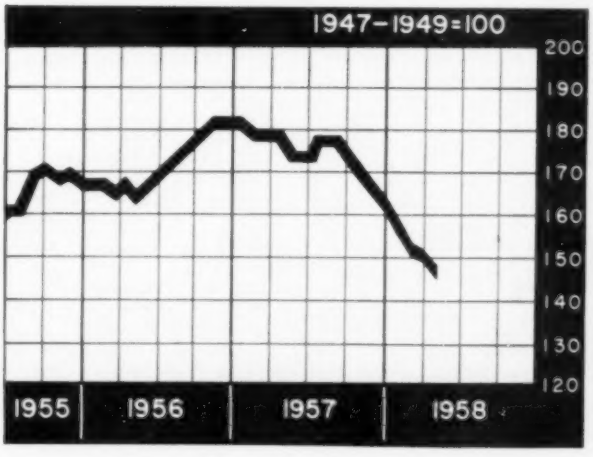
Many firm orders have been placed in stamping plants but without specific release dates, and stampers are leery of going to work on them.

Steel production rate is still very depressed, but warehousers say that customer inventories have improved considerably in recent weeks, indicating that steel production will pick up in the fourth quarter of this year.

Orders for gray iron castings have been moving up slightly over the last couple of months (rising maybe two or three percentage points a month to around 58% of capacity) but foundrymen don't look for any sweeping improvements at least until the latter part of this year.

Aircraft parts makers report orders have been low but steady since the beginning of the year, but they fear volume of orders may drop after mid-year as the field of manned aircraft types is narrowed by the government.

So far, effects of new aircraft and missile defense spending haven't been felt to any great degree by parts makers—and several of them are beginning to think they won't amount to much when they do come along.



AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

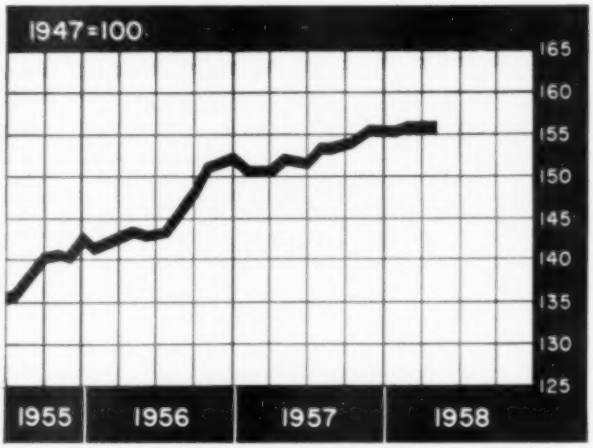
	MAY Estimated	APR. Preliminary	MAR. Revised	APR. Year Ago
Total Index	**147**	**148**	**150**	**176**
Machinery	125	127	152	
Electrical Machinery	169	170	196	
Autos	85	94	127	
Other Transportation	338	333	375	
Other Metalworking	128	130	145	

TRENDS

WHAT'S AHEAD... in Business

AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	MAY Estimated	APR. Preliminary	MAR. Revised	APR. Year Ago
Total Index	**155.9**	**156.0**	**156.0**	**151.9**
Metalworking Machinery		182.3	182.3	176.5
Other Machinery exc. Electrical		166.1	166.0	160.6
Electrical Machinery		157.9	157.5	153.9
Fabricated Metal Products		146.6	146.6	143.4



Personal income is rising again...

Total personal income has dropped only about 1% since reaching its peak last August. In the last three months, moreover, it has been edging up after hitting a low in January. The April figure was $342.8 billion, annual rate.

Personal income has held its own in the face of a 4% decline in gross national product. Its resistance to the slump in business activity does much to explain why the recession has not developed into a dangerous, "self-feeding" downward spiral. Here are some key reasons why personal income has held up so well.

Transfer payments—social security and veterans benefits, unemployment compensation, etc.—have shot up $4 billion (annual rate) since August. The bulk of the increase has come from unemployment payments which have helped cushion the $9 billion drop in wages and salaries. Jobless pay in 1957 totalled $1.8 billion. This year such benefits are running at a rate of over $4 billion a year.

Net farm income in the first quarter soared to $13 billion (yearly rate), a 13% increase over the fourth quarter. The improvement stemmed mainly from rises in farm prices.

Dividend payments have dropped hardly at all, despite a 20% fall in corporate profits from the fourth to the first quarter. A generally solid cash position—due to inventory liquidation and reduced capital spending—has allowed corporations to keep dividend payments at a high level.

Pay in non-agricultural employment remains high. For example, despite shortened work weeks, factory workers' average weekly earnings are down only 1% from a year ago.

In the second half, dividend payments will drop and farm income may tail off a bit. But personal income should continue to rise.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949=100)*	122.5	120.4	143.5
Steel ingot operation (thousands of tons)	1,481	1,412	2,212
Electric power output (million Kilowatt hours)	11,257	11,315	11,519
Production of automobiles and trucks	113,197	105,188	162,537
Engineering construction awards (Eng. News-Record—millions)	$588.1	$435.4	$338.9

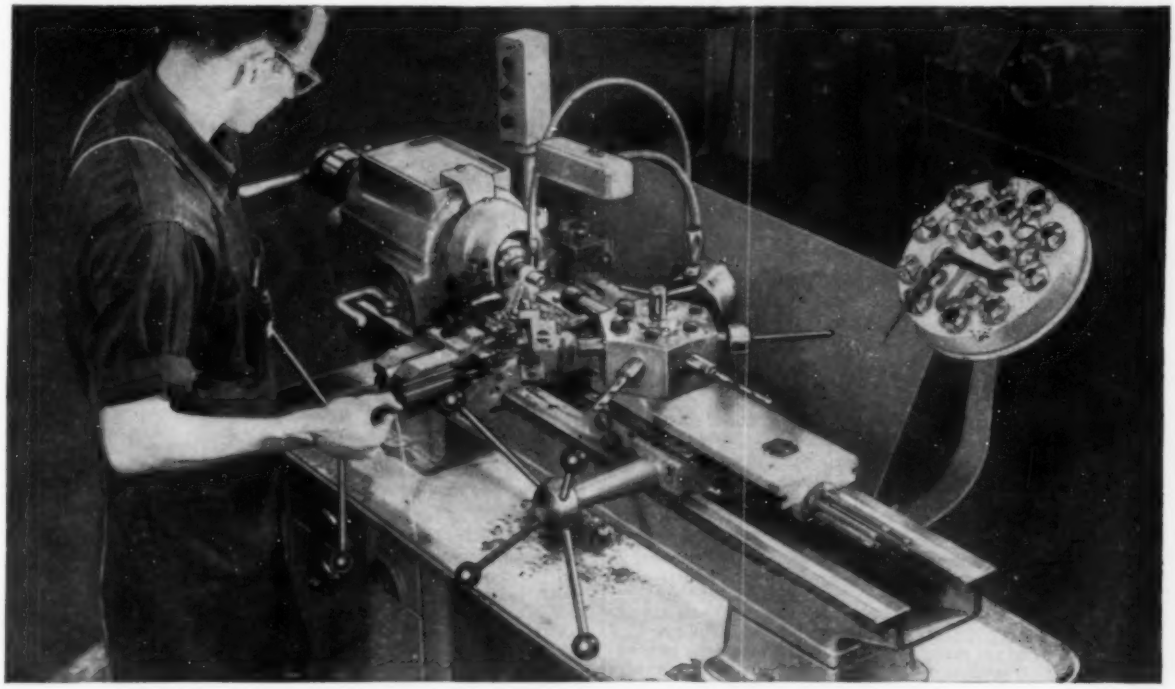
MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949=100)*	126	128	144
Index of durable manufacturers' production (1947-1949=100)*	133	135	160
Durable goods manufacturers' sales, millions*	$11,728	$12,038	$14,198
Machinery manufacturers' sales, millions*	$ 3,688	$ 3,726	$ 4,158
Durable goods manufacturers' new orders, millions	$10,493	$10,598	$13,853
Machinery manufacturers' new orders, millions	$ 3,421	$ 3,545	$ 4,205

* Seasonally adjusted

ROCKWELL-BUILT

NEW DELTA HAND SCREW MACHINE



Cuts production costs

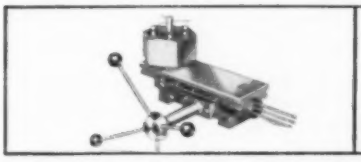
on multiple machining jobs

Here is a precision machine engineered to fill the wide gap between standard engine lathes and expensive automatic screw machines . . . and at lower cost than *any* comparable machine!

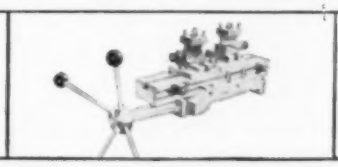
Bed turret, double tool post cross slide and lever type collet closer are included as *standard equipment.* But you don't pay for lathe components you don't use—the carriage, quick change gear box, gear train, gear rack and tail stock.

Delta Quality Features such as perfected Variable Speed Drive and unique Drive Selector offer greater flexibility, assure proper speed and power for each operation. In addition you get the hefty Delta head stock with matched "V" belts in the final drive to the spindle.

Convert Your Delta 11" Lathe to a Hand Screw Machine by adding the three accessories pictured below and removing the carriage and tail stock assemblies. This gives you the double versatility of a ram-type turret lathe for production operations, and a standard engine lathe for toolroom, maintenance and experimental work.



BED TURRET has a self-indexing, six-station head built for heavy duty. It offers a full 4½" tool clearance over the ram and a 7½" maximum working stroke.



DOUBLE TOOL POST CROSS SLIDE features exclusive, new pilot wheel feed for greater safety, speed and convenience. Provides full 8" travel, extra clearance for tools held in bed turret.

LEVER TYPE COLLET CLOSER takes bar stock up to 1⅛" diameter. Used with all 5-C collets. Bars can be fed, chucked, machined and released without stopping the spindle.

See the Hand Screw Machine at your nearest Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

GET ALL THE FACTS on Delta's new Hand Screw Machine, full line of accessories and the complete line of metalworking lathes. Write for **FREE** Delta Industrial Catalog: Rockwell Manufacturing Co., Delta Power Tool Div., 618F N. Lexington Ave., Pgh. 8, Pa.

DELTA POWER TOOLS

another fine product by

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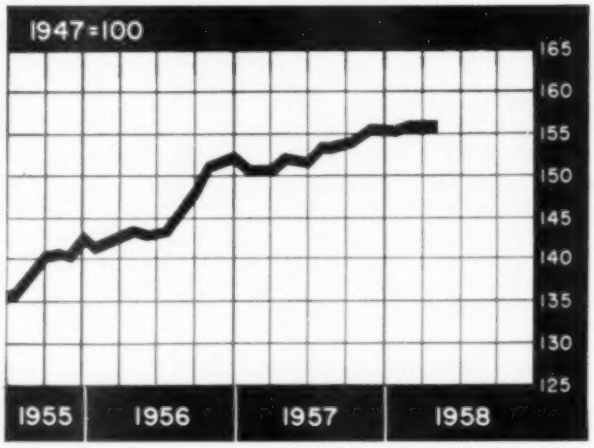

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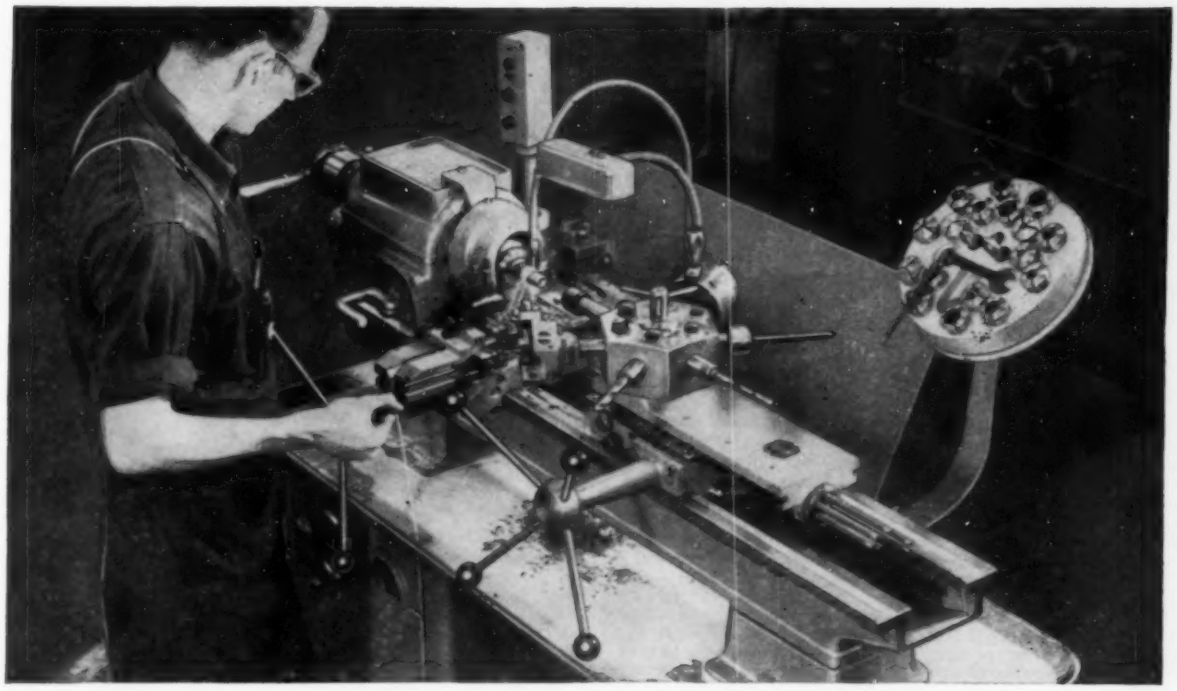

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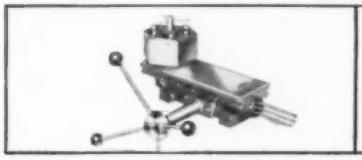

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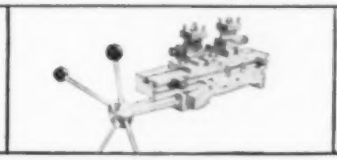

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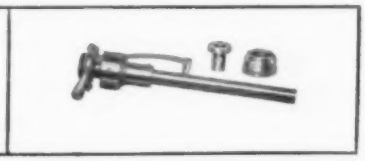

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facts about LEDLOY* FREE-MACHINING STEELS

Considerations in the Use of Inland Ledloy Steels to Reduce Machining Costs*

"Most metalworking plants strive to trim costs as well as metal—so long as quality standards can be maintained. But it takes a lot of ingenuity and 'know how' to neatly balance all three factors: costs, machining efficiency and quality."**

INLAND LEDLOY free-machining steels should be thoroughly investigated in efforts to achieve this end.

You should consider LEDLOY STEELS . . .
. . . if you are presently producing a product from regular carbon steel that requires machining.

The Inland process of adding lead to any grade of steel phenomenally improves machinability without materially affecting other properties. The normally specified physical properties required for a particular application are retained in the equivalent Ledloy Steels. The only characteristic that is affected, and to a marked degree, is the steel's machinability.

Forgings made from Ledloy, for example, can be heat treated and forged in exactly the same manner as similar non-leaded grades of open hearth steels, yet will machine up to 50% faster. A switch to Ledloy for forgings will also result in a superior finish on the machined part.

Whatever grade of steel you are currently using for your products, if machining is an important part of your fabricating process, a change to a similar Ledloy grade can cut your total machining costs appreciably.

You should consider LEDLOY STEELS . . .
. . . if you are presently using a non-leaded machine stock.

Ledloy Grade A, the most widely used leaded steel grade, machines from 25% to 55% faster than regular free-machining steels and yet retains all the desirable characteristics of the non-leaded grade of comparable base analysis.

The precise quality control measures used by Inland in the production of Ledloy Steels result in a surface that is superior to similar non-leaded machining steels. Tolerance control is easier and the completed part has a finer, smoother finish.

You should consider LEDLOY STEELS . . .
. . . if you are presently machining parts from free-machining brass.

Ledloy Grade B, a steel that is somewhat more costly than Grade A, has been used successfully as a substitute for free-machining brass in a number of applications. The basic material cost of Ledloy Grade B is only about half as expensive as brass, yet approaches brass in machinability. However, the higher scrap return on brass, over leaded steels, must be considered in estimating overall cost savings.

If machinability rather than corrosion resistance or non-magnetic properties is the primary reason for the use of brass in a given application, Ledloy Grade B should be seriously considered for its cost-saving advantages. Because leaded steels weigh less than brass, they yield more parts per pound. Then, too, the greater strength of leaded steels often makes possible the redesigning of a machined part to obtain material savings with no loss of strength.

GENERAL CONSIDERATIONS

1. **Amount of Machining.** Ledloy Steels were developed by Inland to provide a more efficient machining steel. The advantages of their use are in direct proportion to the amount of machining performed on parts made from them. The greater the amount of machining, the greater the possible savings using Inland Ledloy Steels.
2. **Capacity of Equipment.** If your present equipment is not being run at full speeds or feeds, considerable savings can result by using Ledloy grades and taking advantage of their much greater machining rate. Increased speeds and feeds are possible, and with reduced tool wear.
3. **Surface Finish.** If finish is important in the machined product, Ledloy Steels can be beneficial. The superior finish resulting from the use of Ledloy Steels has made possible the elimination or reduction of costly additional processing in a number of applications.
4. **Tool Life.** If the machining operation wears tools excessively, necessitating frequent changes, or if tool cost is relatively high, Ledloy Steels can effect significant savings. Because of its lower friction component, plus the fact that Ledloy provides better chip formation, tool-edge build-up is cut to a minimum when machining Ledloy steels. Ledloy Steels actually lubricate the tool face, reducing heat generated and minimizing tool wear. This means greater production per tool change and decreased costs.

Many grades available—Inland Ledloy free-machining steels are available in a wide range of standard carbon and alloy grades in bar form. Ledloy free-machining plates are also produced.

If your product requires machining, it will pay you to get all the details on Inland Ledloy . . . the original leaded steels. Ask your cold-drawer about them today, or write Inland Steel Company, 30 West Monroe Street, Chicago 3, Illinois, for the interesting booklet, "Properties of Inland Ledloy Steels."

***Iron Age Special Feature #10, July 25, 1957. "How to Get More for Your Metalworking Dollar" (Machining Ferrous Metals)*

INLAND STEEL

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport
St. Louis • Kansas City • Indianapolis • Detroit • New York

INLAND

Ledloy Steels
the world's most machinable
*Reg. Trade Mark

American Machinist

MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

More Profits for Uncle Sam

Two misconceptions about a more liberal tax depreciation policy on capital goods have been going the rounds. They should be cleared up.

The first is that the Treasury Department will lose a lot of revenue as a result of the new policy. We believe the opposite to be true. The federal government's take will be larger.

There may be some loss in revenue the first year. We think, however, the estimates of the size of this loss are much too high.

Bear in mind that as soon as a liberalized depreciation policy took effect, it would stimulate demand for cost-cutting equipment. Industry then would be able to help solve the problem posed by the present cost-price squeeze. Corporation profits would go up and Uncle Sam's revenue would benefit accordingly.

Increased taxes derived from . . .

higher profits would partially if not wholly offset the decreased tax revenue stemming at first from speedier depreciation.

Should the Treasury Department experience a loss in revenue at the beginning, the cost would be trifling compared with the cost of a gigantic public works program, or of a big increase in unemployment insurance, or of an across-the-board income tax cut.

The second misconception is that the privilege of recovering its investment in capital goods faster would be a giveaway to industry. How can the term giveaway be applied to a policy that encourages industry to keep its plant and equipment up-to-date, that results in pushing costs down and productivity up, that is bound to put more money rather than less into Uncle Sam's till?

A more liberal and realistic depreciation policy would bring this country into line with the long-prevailing practices in other countries. The British, the Germans, the Swedes and the Canadians have consistently adhered to a policy that is admirably summed up by L L Colbert, president of Chrysler Corporation, in these words: "Other countries have discovered that they can speed up their industrial growth by gearing their tax policies on depreciation to the realities of twentieth-century technology."

American Machinist proposes . . .

that Congress pass the following two-point program that will gear U S tax policies on depreciation to the realities of twentieth-century technology:

Permit purchasers of capital goods within the period between July 1, 1958, and December 30, 1959, to depreciate their entire new investment within five years.

Authorize use of the bracket method of writing off investments in capital goods, with the average depreciable lives for production equipment put in the five-to-ten year bracket, this method to become effective January 1, 1960.

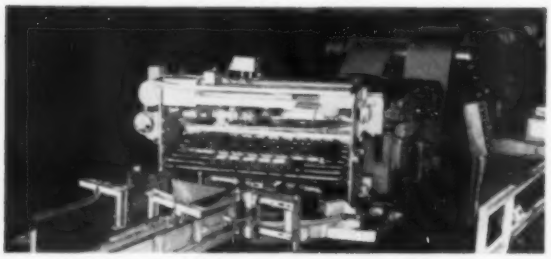
Prompt passage . . .

of this proposed legislation will mean more revenue rather than less for Uncle Sam. It bears no resemblance whatsoever to a giveaway. It will revitalize the capital goods segment of our economy and will encourage industry to keep up with rapidly changing technology and new cost-cutting techniques.

Write your Congressmen and Senators to vote for a more liberal depreciation policy on capital goods.

Burnham Finney EDITOR

Cincinnati Shear swivels for mitre cuts at Budd



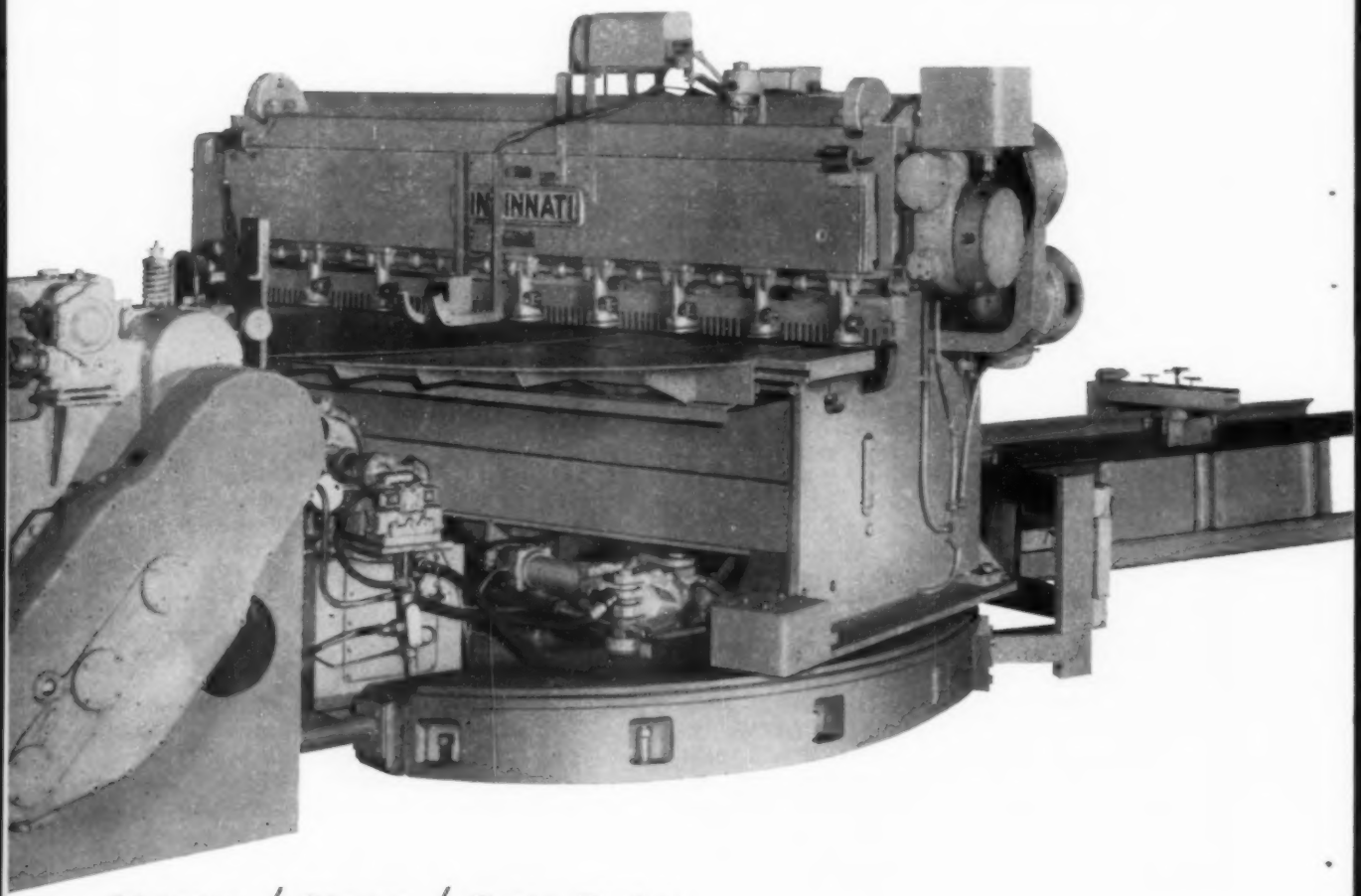
This Cincinnati Shear is an integral part of an automatic decoil and shear line at The Budd Company's Gary, Ind., plant. It is used for straight and mitre shearing of coil stock into sheets.

Mounted on a swiveling base, the shear can be rotated 22½° to either side of center, so the operator can pre-set the desired angle of cut.

Accuracy must be within ⅛" per 80" of feed. Sheet widths range from 24" to 72" and thickness from 21 to 16 gauge (.0349" to .0625"). Since the operation must be automatic and continuous to be economical, Cincinnati dependability is a vital asset.

This shear was specially engineered for The Budd Company. However, most of its profitable features are available with standard Cincinnati Shears. They include powerful hydraulic hold-downs, all-steel interlocked construction, and one-clearance shearing of different metal thicknesses.

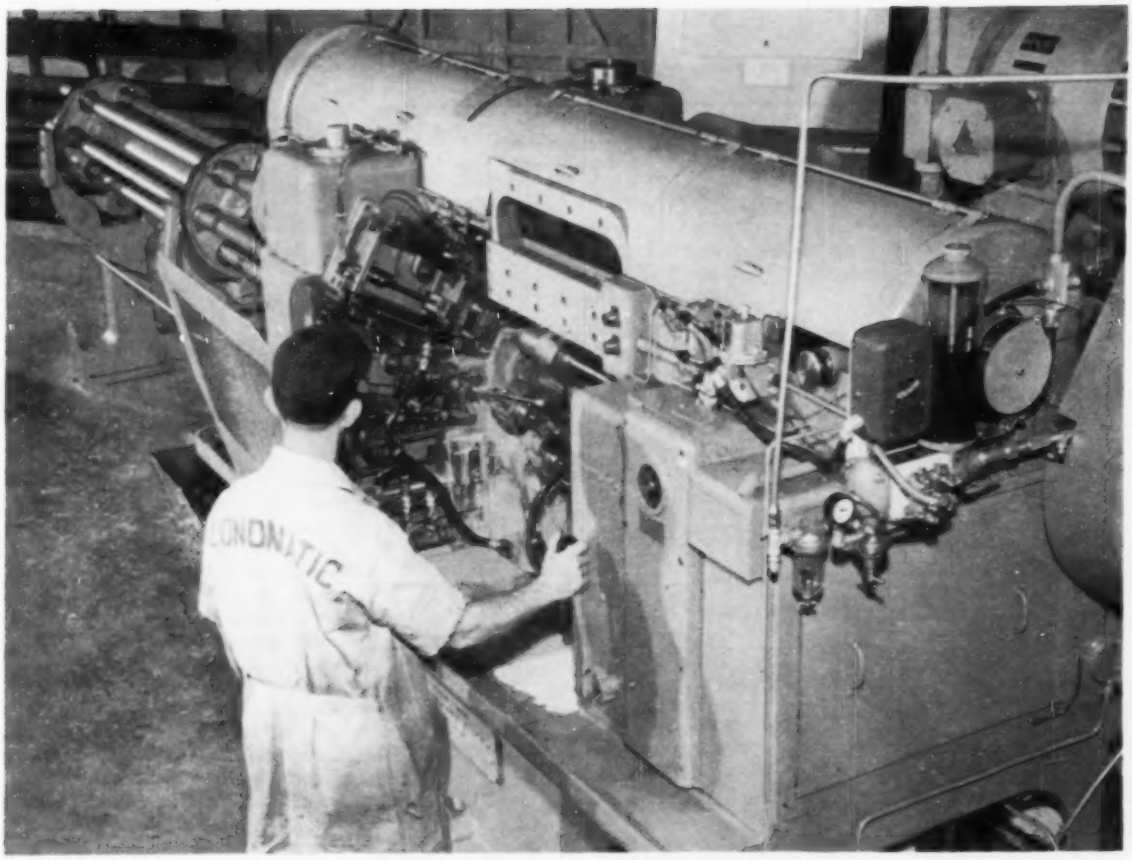
Complete details on Cincinnati All-Steel Shears are included in Catalog S-7R. Write to Dept. A.



Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.



Spark-plug shell is first part tested as . . .

Seventeen-company program seeks optimum machining rates

WINDSOR, VT—A cooperative project to develop optimum machining conditions for parts produced on multiple-spindle bar automatics has been launched by 17 companies. Called the Cooperative Machining Project, Comapro for short, the research will be done in a special department established at Cone Automatic Machine Co here.

The project grew out of evidence that too many companies fail to take advantage of the potential available in their equipment today. Aim of the project is to make detailed studies of typical high-volume parts to find the combination that will result in the lowest cost per piece produced. Allied with Cone are companies producing bar stock, tools, toolholders, tool maintenance equipment, measurement equipment, and coolants and lubrication equipment.

First project started is on a spark plug shell; work on this component started about three months ago. Any company can submit a component to any of the sponsors for study. If accepted, there will be no charge for the research, but none of the pieces produced during the work can be used except as samples. Although the department is designed for test rather than for display, visitors will be permitted each week from Monday through Thursday.

Sponsoring Companies

Bar Stock will be supplied by Jones & Laughlin Steel Corp and Joseph T Ryerson, Inc. The spark plug shell is being made from J&L type A leaded steel. The second component will be a bushing made from Ryerson leaded 8630.

Cutting tools are supplied by Firth Sterling Inc. These will include high-speed steel, cast alloy, and carbides. Because HSS is more prevalent on bar automatics, initial tests will be with this material.

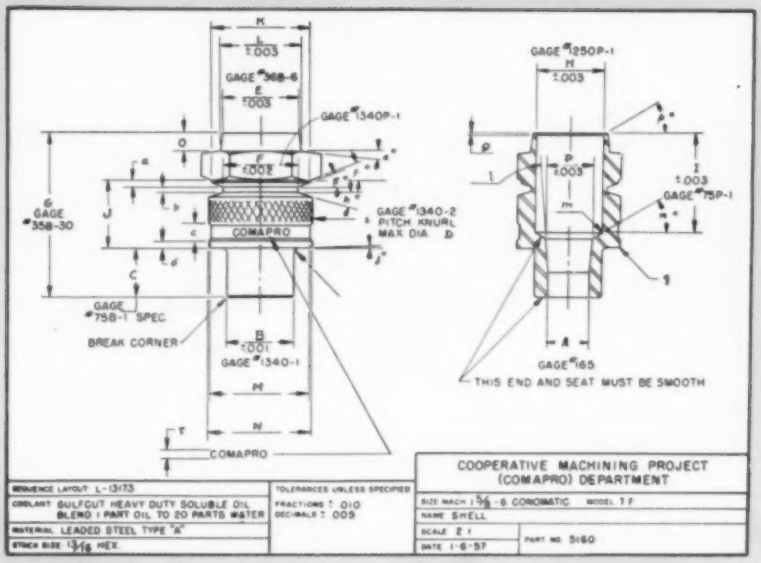
Ground thread taps are supplied by John Bath Co, Inc.

Drills, counterbores, and reamers come from Cleveland Twist Drill.

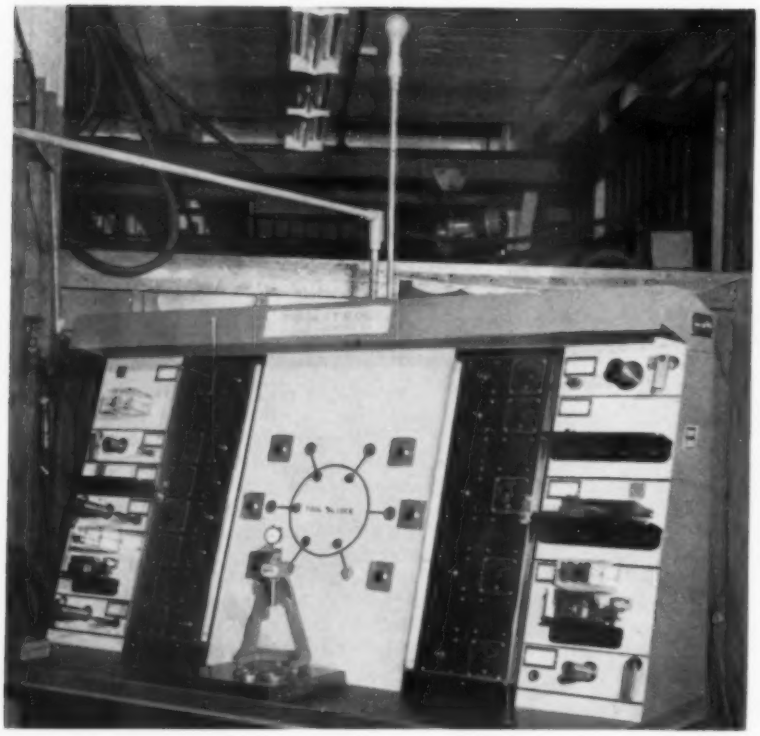
Self-opening dieheads and hollow mills are from the Thread Tool Div of Jones & Lamson Machine Co.

Coolants, greases, and lubricating oils are provided by Gulf Oil Corp.

The basic production machine in the department is a 1⅝-in. Model TF 6-spindle bar Conomatic. Lincoln Engineering Co. has equipped this with an electrically timed central lubrication system. Scully-Jones & Co has provided a "Toolitrol" control board for scheduling tool changes on the machine.



First test . . .
is this spark-plug shell made from 13/16-in. hex bars. The job was tooled with high-speed steel for the first series of tests, now in progress. Parts produced are marked "Comapro" to prevent their subsequent use as commercial products



Tool Control Center to preset tools . . .
includes counter swiches set to stop machine when any tool has run a predetermined number of workpieces. Replacement of nine perishable tools in standard holders for the spark-plug job is 42 min 35 sec. In preset holders, the same tools can be replaced in 5 min 40 sec. At present cycle time 492 pieces are produced in the time saved in one complete tool change by use of preset method. This control center was supplied to the project by Scully-Jones & Co

For tool and department maintenance, the equipment will include a No. 3B horizontal-spindle surface grinder from Abrasive Machine Tool Company.

Drill grinding will be handled on a Model 3B precision drill grinder, with web-thinning attachment, from Black Diamond Saw & Machine Works.

For tap grinding, there is a No. 2 chamfer grinder and a flute grinder, both from Edward Blake Co.

A universal form-relieving tool grinder to grind tool diameters and angular and radial reliefs is supplied by Royal Oak Tool & Machine.

For presetting tools and other measurement work, there is a 30-in. optical comparator and measuring machine from Jones & Lamson Machine Co.

Adjustable mechanical gages are provided by Federal Products Corp.

Hardness tests on both bar stock and tools will be made on a Rockwell hardness tester supplied by Wilson Mechanical Instrument Div, American Chain & Cable.

Surface finish measurements will be made on a Surfindicator supplied by Brush Electronics Co.

Plan of the Project

Behind the project is the recognition that effective use of bar automatics depends on six factors: bar stock, tools and holders, measurement control, coolant and lubrica-

tion, the machine itself, and the personnel entering into the supply and use of the other factors.

The idea originated at Cone, after discussions with users, and the proposal for a cooperative educational research program was made to supplier companies. Research projects will concentrate on large volume, popular grades of steel, and commonly used tool combinations. In each case the job will be carefully analyzed to establish the tooling that seems best and test runs will be made, ending with a production run under optimum conditions to determine cost per piece.

On the initial project with a spark-plug shell (see drawing), the first run was made with a 5.5 sec cycle. Speed was increased to a 3.8 sec cycle. At present the job is running with a 4.41 sec cycle, which seems to be about the optimum with high-speed tools. Cast alloy tools will next be tried to see if a lower cost per piece can be obtained.

As the project builds a record of experience on typical projects of various types, it is expected that a user of automatics will be able to find a similar job in the records to compare with one he is handling or anticipates.

In addition to improving the utilization of bar automatics in industry, it is hoped that the project will develop data useful in cost estimates. A survey by the Screw Products Manufacturers' Assn disclosed such wide variation in bids on the same work as to indicate the need for both improved machining practice and more standardized methods of finding costs.

Russia eyes western-made capital goods

WASHINGTON—A major switch in Soviet economic policy may make the Soviet Union an important market for Western consumer goods producing machinery—as it was for heavy industrial equipment in the thirties.

Moscow apparently intends now to give the long oppressed Russian consumer a break. That's the conclusion many of the West's Russian experts reach from studying recent official Soviet pronouncements and actions. It's been a major theme of many of the speeches of Soviet leaders recently. Serious steps are being taken to sharply increase output of shoes, furniture, textiles, and housing under the new Seven Year Plan to be announced in July.

Khrushchev gave the clearest indication of the new trend—and what it may mean to Western business—in a speech to the Central Committee of the Soviet Communist Party. He called for investing 100 billion rubles in expansion of the Soviet chemical and synthetic fiber industries between now and 1965. And he proposed buying a substantial slice of the needed plant, equipment and technical knowhow in the U S, Britain, and Western Germany.

Khrushchev in his speech said:

"Such deals would be mutually advantageous. The Soviet Union would be given the opportunity of quicker fulfillment of its program for the construction of new enterprises without wasting time on creation of plans and mastering of the production of new types of equipment. The United States and other capitalist countries on the other hand would receive considerable orders which would help in greater employment of workers. The industrialists would also profit from it, of course.

"It must be recalled that before the war there were good relations between us and American industrialists, for example Ford, and such large U S firms as General Electric and International Harvester. It is sufficient to remember that in 1931, for example, Soviet goods purchases in the United States reached, in today's prices, almost $600 million; *about 40% of all machines and equipment exported by the United States were bought then by the Soviet Union, biggest customer of the U S machine tool industry.*

"We also had good commercial relations with the industrial enterprises of West Germany—with the Krupp firm, for example. Considerable orders for the delivery of equipment used to be carried out by a number of British firms."

Moscow has called for western bids on sixteen chemical plants with a total value of about $100 million—as a first installment.

Interested in Whole Plants

The trend isn't limited to chemical plants. The Russians recently contracted to procure one of the largest and most modern tire factories in the world in Britain at a cost of some $40 million. The Soviets also have showed interest in procuring textile machinery, agricultural and food processing machinery, and leather-working machinery in the West. In most cases, the Russians are interested in procuring whole plants and extensive technical assistance, not just isolated bits of machinery.

How big a market the Soviet Union may become for consumer-goods-producing plants is just guesswork at this stage. The total Soviet investment in such facilities probably will be large over the next seven years if advance indications are borne out. But as in the past the Russians probably will concentrate on buying prototype plants from the west for copying in Russia. This would reduce greatly the potential Western share. But even so, officials guess that total Soviet demand for such Western equipment might run into billions over a period of years.

Britain and Germany are likely to get a larger share of whatever Soviet buying there is. They are more dependent upon exports and likely to push harder to get the orders. Moscow up to now has seen bigger political gains in expanding trade with Western Europe than with the U S, although this could change.

Moscow has solid reasons for looking to the West for equipment to implement its consumer goods drive. Getting whole plants of the latest design from the West could save valuable time and in the long run be cheaper in terms of Russian resources. Fewer resources and technicians would have to be diverted from heavy industry and defense work. Some surpluses of nonferrous metals and other goods seem to be showing up in the Soviet Union. These could be exported to pay for imports of equipment. Importation of the most modern Western equipment and operating techniques could set higher standards for the lagging Soviet and consumer industries and improve productivity.

First step in North American's hot-sizing method . . .

Flat blank, preheated to 500 F, is placed on die for forming with the Guerin (rubber-pad) process. An aluminum overpress (manufacturing support) is placed over the titanium blank. The overpress is then routed to the shape of the titanium blank, except that $\frac{3}{8}$ in. of aluminum is allowed to extend out on each side. This insures good clamping action as the overpress wraps around the titanium during forming. Purpose of the overpress is to protect the titanium, improve its ductility, facilitate forming of close contours, and cut down on the number of wrinkles in the finished part

HOT SIZING—Hottest way yet to

Parts are being made to "impossible" accuracies from sheet-metal titanium and high-temperature steels at North American Aviation. "Hot sizing" is North American's term for a brand-new technique that cuts out 99% of bench checking and straightening, slashes tool costs, and produces better parts 13 times faster than by old methods

GEORGE H DE GROAT, associate editor

Hand working of formed titanium and HSS steel parts—long one of the aircraft industry's most expensive and time-consuming processes—is as dead as the dodo (at least 99% so) at North American Aviation Inc, Los Angeles, where a new "hot sizing" technique removes cans, wrinkles, buckles and other stress-relieving and preforming bugs in a matter of minutes.

Tooling costs have been cut drastically, too, because dies can be made to net sizes, without allowances for spring-back or heat growth. Finished part quality is better (no residual stresses in the metal), and production rates have soared as operation after operation has gone by the boards.

Not only that, the hot sizing process can loose-stress-relieve parts before hot straightening, without recourse to jigs and fixtures; ovens once needed for hot straightening can be released to do other jobs; and parts can be finish-formed to minimum-bend radii without any cracking.

In turning out commercially pure and alloy titanium, in production runs on 17-7 PH steel, and in experimental runs on AM-350, 19-9DX, Inconel X and other exotic materials, North American found that hot-sizing presses can be used successfully not only on today's metals but on many others that may be developed in the future.

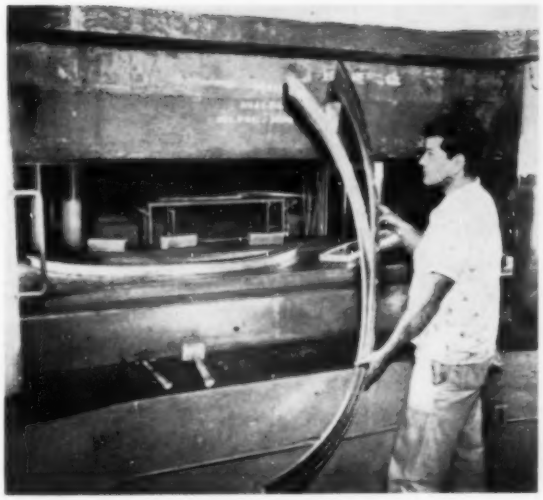
Hot sizing works this way: (1) parts are preformed on drop hammers, hydraulic presses, stretch presses or similar equipment, then (2) basket stress-relieved loosely in ovens, (3) placed cold on hot dies in a sizing press, (4) press is closed and pressure is applied to the top, bottom and sides of the part at elevated temperatures.

Tooling is kept at the required operating temperature during the entire run of parts. Dwell time for each part is normally 5 to 10 minutes, depending upon gage thickness, part configuration and the amount of metal movement required.

Upon removal from the press, parts are allowed to cool at room temperature without restraint. Usually, the presses are kept at operating temperature for a full week, are shut off only on weekends.

Basic function of the hot sizing press is to apply pressure and heat over predetermined periods of time, dependent upon the thickness of the material, type of material, and the geometry of the part.

Top and bottom press platens are



After preforming . . .

. . . overpress is removed and is reclaimed as scrap. Aside from the Guerin process, North American often forms titanium parts cold in drop hammers, or folds them in a brake when required contours are simple. Handworking to remove distortion has largely been eliminated in all these processes

Before hot sizing . . .

. . . and after hydraulic press forming, parts that have a complicated joggle are struck in a V-die on a punchpress to set the sharp angle. Joggle dies help locate the part in the hot-sizing die and hold it within reasonable accuracies when extreme contours, sharp radii and great depths are involved

precision-form titanium?

heated electrically, accurately temperature-controlled up to 1400 F. Side-mounted hydraulic cylinders at front and back apply side pressures up to 75 tons. When the press is closed, a lower vertical ram exerts top and bottom pressure up to 300 tons.

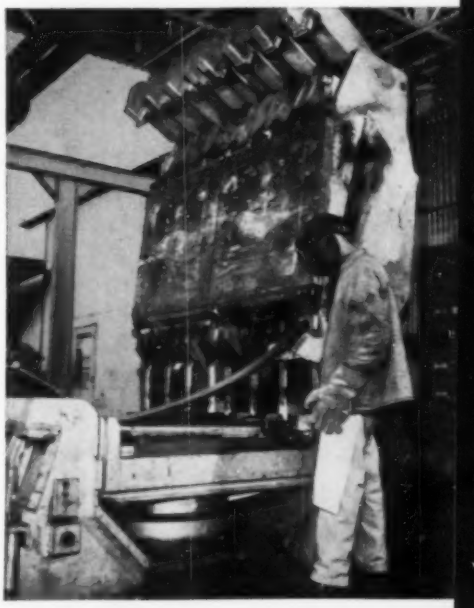
Pushbutton panel on each press controls raising and lowering of the press lid (opening and closing the press), directing the vertical ram up and down, as well as the in-and-out movement of the side pressure cylinders. Presses are equipped with indicating pyrometers and a recording pyrometer.

The presses, which are now being built commercially by Sheridan-Gray Inc, Torrance, Calif, division of T W & C B Sheridan, under license from North American, come in two standard sizes (36 x 36 in. and 48 x 48 in.). Constructed on the "building block" principle, these units can be hooked together to operate as one machine with a single control panel, or can operate individually with separate controls. In this way, the presses can either form a number of small parts, or form long parts in minimum floor space.

Before hot sizing came along, North American attempted to form titanium with aluminum forming techniques, based upon the Guerin (rubber - pad forming) process. Breakage was frequent and heated blanks were then employed to overcome the problem. Drop hammers and punchpress draw dies were added to the process, too, but results were still unsatisfactory.

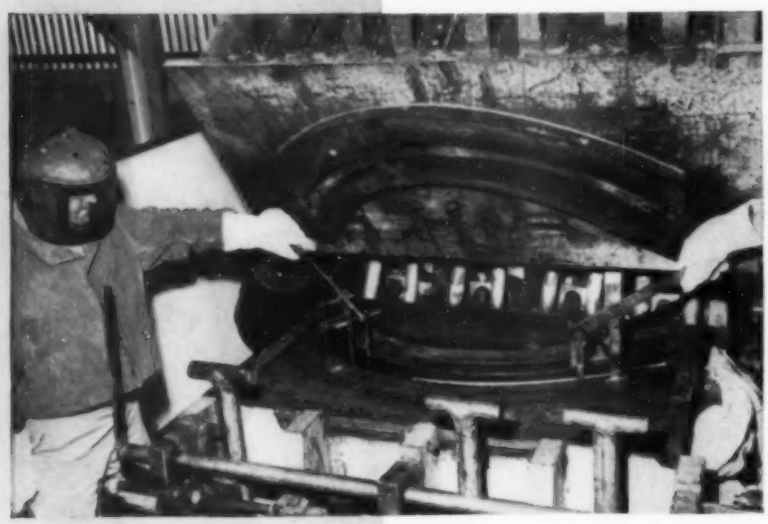
Steel stress-relief fixtures were developed to reduce the warpage induced by stress relieving. These were designed to restrain the part during the stress-relief operation, and during the cooling period that followed. But this demanded excessive heating and cooling periods (around five hours) and production was consequently slow. Too, oven capacity was limited, fixture maintenance was excessive because of warpage. Only parts preformed to close tolerances could be used in the fixtures, no forming action was possible with the fixtures, and much hand work was required to finish the parts to tolerances.

Later at North American bi-metal hot straightening fixtures replaced stress relief fixtures. Although similar to the old tools, these hot-straightening fixtures provided a



Hot Sizing . . .

. . . sharpens contours, brings parts into close tolerances. Depending upon the part material and its thickness, hot-sizing temperatures range from 1000 to 1300 F, for 5 to 10 minutes. Usual side and top pressures range from 15 to 20 tons, although greater pressures can be used. Either half of this 2-section Sheridan-Gray press can be operated individually, so that two different jobs can be run at once. Hydraulic cylinder under the press and away from heat applies up to 300 tons pressure to move lower platens upward, as cam-actuated members apply up to 75 tons side pressure



Special pulling tools . . .
remove finished parts from the hot-sizing press without distorting them. Titanium channel being removed here was under 950 F heat and pressure for 15 minutes. During hot sizing, a patented self-healing wax coating (North American's "Sabrex") protects the dies from scratches and preserves finish of the part itself

Hand forming is out . . .

Less distortion . . .
results form hot sizing (left) than from stretch forming (right) on 0.040-in.-thick 110-AT part 6 in. wide by 36 in. long. Hot sizing took only 15 minutes on this part

. . . and costs are down . . .

Savings of $45 per part . . .
and a production rate of 3 parts every 15 minutes resulted from hot-sizing this AMS-4908 (0.040 by 14 by 36 in.) part. Photo at top shows warped part before hot sizing, and same sharply contoured part (below) after hot sizing

forming action that cut out much of the hand work. Stress relieving prior to hot straightening also helped boost output. But high-furnace capacity was still needed, maintenance costs were high, and heavy fixtures (up to 3000 lbs) created handling problems.

Next big step was development of "overpress" material — ¼-in. 6150 aluminum. Cut to match the contour of the blank to be formed, but about ⅜ in. wider on a side, the overpress was placed on a heated titanium blank in the heated die in a hydraulic press.

Asbestos masked the rubber in the press from contact with the heated surfaces. By sandwiching the titanium part with the die, parts could be formed almost free of wrinkles—and they were more accurately contoured than parts made previously.

Then came North American's first hot-sizing press—a gas-flame oven with hot-straightening components. This press could process a wide variety of titanium parts, merely by having its dies and steel liners changed.

Unlike the bi-metal fixture, this first hot-sizing press and its dies did not require cooling after each straightening operation.

Electrically heated top and bottom platens were introduced next. These improved heat control, and produced perfect finished parts. Platen warpage, hydraulic and electrical maintenance problems, and the heat variations over platen areas, caused by gas heat, were eliminated.

Other Materials, Too

Today, North American's successful production of high-quality titanium parts has led the company to try hot sizing of other hard-to-form materials. Early experiments in hot sizing 17-7 PH stainless proved that parts could be produced at reduced cost. Because the metal showed no growth resulting from restraint in hot sizing, under-developed templets, nibbler jigs and steel dies were discontinued. Now, steel dies for hydraulic presses can be made to net size without allowance for spring-back, so that these same dies can be used in hot-sizing presses by the simple addition of steel liners.

In one case, a 17-7 PH blank was trimmed to net size and preformed in a 4500-ton hydraulic press at 6800 psi. Ten minutes of hot sizing at 950 F followed. Results were excellent, and contour and degree bevels were within tolerance. Much the same thing was done with Inconel-X parts, and results were equally good—clearly indicating that high-temperature metals of the future may be hot sized successfully, too.

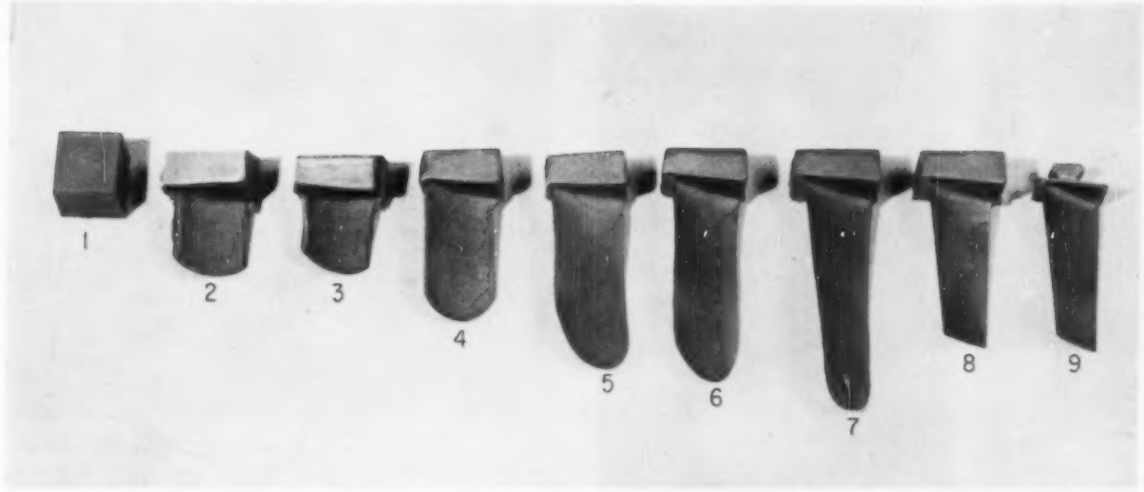
Case History

Improvements in aircraft design naturally follow improvements in manufacturing techniques. Here's an example of what hot sizing has done: a labor factor of 1 can be applied to making an F-100 frame member from 0.090-in.-thick 75 ST aluminum. This material has an ultimate tensile strength of 72,000 psi, and an ultimate yield strength of 52,000 psi.

Low Labor Factor

The same part, made from 0.090-in.-thick 4908-T titanium, has an ultimate tensile strength of 129,000 psi and an ultimate yield of 110,000 psi. Yet the labor factor, with hot sizing, is only 1.15. Even better results can be gained by using 0.090-in., 17-7 PH steel. Here, the ultimate tensile strength is 180,000 psi, ultimate yield 150,000 psi. Labor factor, with hot sizing, is 1.07—barely more than that for the aluminum part.

And with 0.090-in. 17-7 RH-950 steel, an ultimate tensile strength of 200,000 psi and ultimate yield strength of 180,000 psi are achieved with a labor factor of 1.07.



Nine steps to a blade are shown in a third-stage compressor blade from the T58 engine: 1, cut slug; 2, hot extrusion of material for blade; 3, pre-pinch to flatten platform and form fillet; 4, pinch and roll operation; 5 and 6, additional pinch and roll operations; 7, coin to airfoil shape (dimple at end serves as a locating point for trim); 8, trim; 9, mill and broach dovetail on platform

Pinch and Roll Dies Halve Blade Cost

Combined forming and rolling in a single press die offers consistency and cost savings, may broaden applications for rolling

ANDERSON ASHBURN, managing editor

LUDLOW, Vt—A revolutionary die that combines the principles of forming and rolling has been developed by three manufacturing specialists in the Small Aircraft Engine Dept of General Electric. The men who developed the die are William Paille at the Ludlow plant and Gene Belli and Frank Fowler at the Lynn, Mass, plant.

The new pinch and roll process, which is being patented in their names, will cut the cost of making small compressor blades in half. In the T58 helicopter engine the saving in manufacturing cost per engine will be about $2000.

Small compressor blades have been a manufacturing problem from the beginning because it has not been possible to forge them within required tolerances. At GE, considerable success has been achieved with rolling the blades.

For the T58, however, the designers wanted a blade with a large, flat platform and it was impossible to produce this platform on conventional rolling equipment.

Working in the basement of an old woolen mill in this tiny Vermont village, the three specialists devised a method that first uses rolls in the manner of forming dies, then as conventional rolls. The pilot operation they have built could produce blades at 100 per hour.

If demand develops for blades in quantity, the loading and unloading operations could be mechanized, speeding the output considerably.

Even more important than cost is the consistency of blades produced by the new method. As John Frandsen, blade specialist, put it: "If one is off, they all are off." Thus accuracy depends on the dies. Because there is an equalizer link in the roll mechanism, scuffing between blade and roll is eliminated. No idea of roll life has been developed, but one set of rolls has produced more than 50,000 blades to date. This lack of scuffing also means that roll finish is not as critical as it is in through rolling.

Almost all the metal flow is longitudinal, giving desirable grain structure in the blades, virtually eliminating flash along the edges, and suggesting that it may not be necessary to sink the cavity into one of the rolls.

HOW PINCH-ROLL WORKS

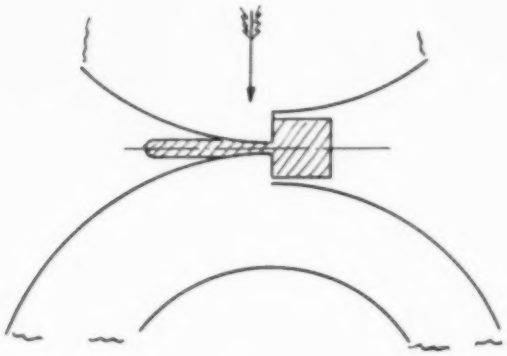
The Stage 3 dies, for example, are mounted in a straight-side mechanical press (a 95-ton Bliss) which has been half-cycled. (That is, each starting impulse sends the ram through only a half cycle, down or up.)

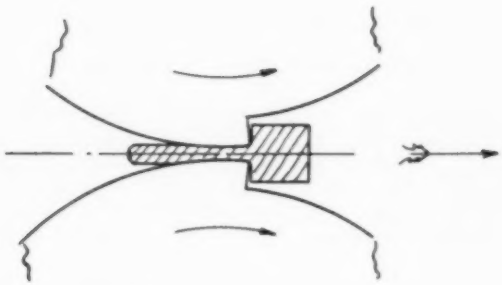
The dies are roll sections with the impression of the top of the platform and the blade. The lower roll is mounted to the press platen and the upper roll to the ram. Rotation of the rolls is by crank action through mechanical linkage to a hydraulic cylinder at the rear of the fixture.

A pneumatic cylinder clamps the work in a carrier at the front of the fixture and a hydraulic cylinder ad-

Pinch and Roll Dies Halve Blade Cost . . .

Knuckle die for pre-pinch . . .
has die halves pivoting on knuckles. Heated part is placed in die and press ram folds die halves together to iron the platform and fillet almost to size





Here is the secret . . .
These rolls are stationary when they pinch the work at the start, then they revolve to roll the blade

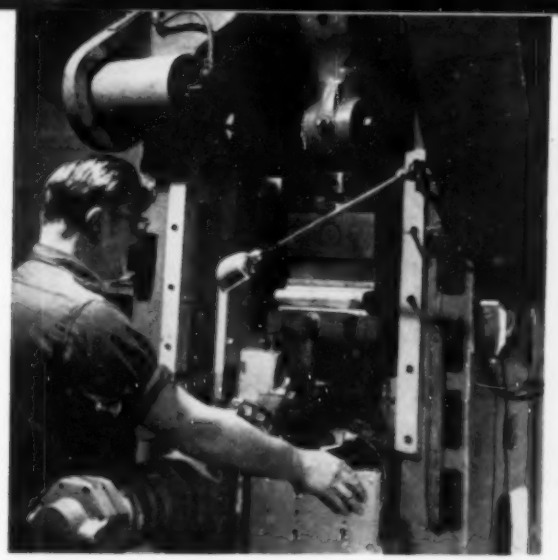
vances it into the die and places it in position on the lower roll. The press ram descends, providing a pinching action on the top surface of the platform and the fillet surfaces. Jackscrews on the bottom of the ram contact a mechanical linkage that applies locking pressure against the base of the blade during this pinching operation.

The blade form is then rolled outward from the fillet by simultaneous operation of the two hydraulic cylinders: one operating the rolls and the other retracting the work enough to keep the blade under tension.

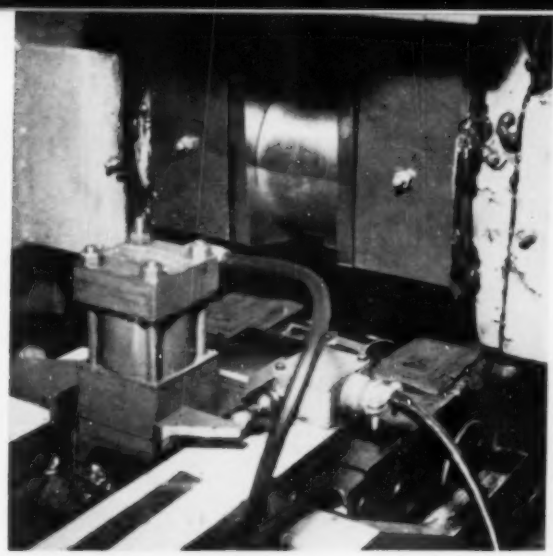
The stage 3 blade illustrated is produced cold in three sets of pinch and roll dies with two passes taken in each die and an annealing operation between dies.

At present the work is loaded by hand and clamped by a hand-operated switch on the air valve. The rest of the cycle is automatic and is programmed by limit switches. When the operator pushes the two start buttons (one for each hand), the carrier is advanced into the die, a trigger on the carrier contacts a limit switch that sends the ram down, a trigger on the ram actuates the rolling operation, another trigger on the carrier causes the ram to return.

Hydraulic pressure is supplied by a 7.5-gpm constant-volume pump that bypasses at 600 psi. Pump output goes to the rear cylinder through a 150-psi relief valve with the relief volume serving the front cylinder. Thus the front cylinder cannot operate unless the roll-actuating cylinder is under full pressure. The supply to the rear cylinder next goes through a one-way



Pinch and roll die in press . . .
with work mounted in chuck ready for start of operation. Carrier arm drops to horizontal position as it is advanced into die by hydraulic cylinder at bottom left



Start of press stroke . . .
Work is in position on bottom roll and upper roll starts down to pinch blade between rolls. Mechanical linkage applies pressure to base of platform as rolls close

Rolling operation follows . . .
as hydraulic cylinder retracts carrier enough to keep tension on blades and a second cylinder in the rear operates the rolls

Roll operating fixture . . .
seen from rear of press. Hydraulic cylinder operates both rolls through an equalizer linkage that adjusts for variations in roll speed required to prevent scuffing

valve so that pump failure cannot cause the rolls to shift out of pinch position. For the rolling operation, oil return is through a solenoid-operated relief valve controlled by the limit switch on the press ram. In addition, air and hydraulic safety valves are included in the circuit.

MANUFACTURING CYCLE

Blades are produced from mill-finished bars of 403 stainless. Slugs are cut from the bar with a Radiac abrasive wheel and deburred on an abrasive belt. According to Ted Ferren, who supervises the manufacturing engineering specialists in the Small Aircraft Engine Dept, this operation will be replaced with tumbling. Slugs are induction heated and the blade material is extruded, then descaled by an acid tumble.

An ingenious knuckle die flattens the platform top and forms the fillet radius within about 0.010 in. of final size. The extruded slug is heated and placed in a die the halves of which pivot around knuckles. When the press ram strikes the top of the die the two halves fold together in a pre-pinching operation.

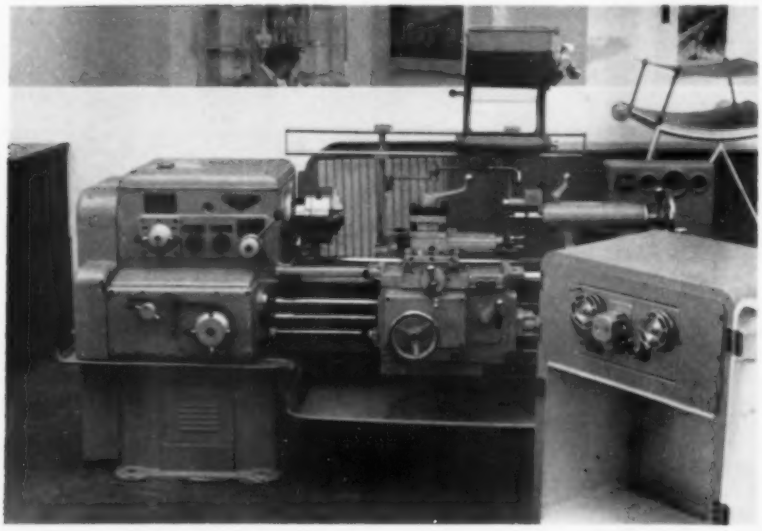
The parts are then tumbled and annealed in a dry-hydrogen atmosphere at 1750 F. Following this anneal two passes are taken in the first pinch-and-roll die. The cycle continues with anneals between operations until the blade is rolled to size. Then the blade is coined to form, trimmed, and hardened. After complete inspection of the airfoil the tang is machined from the platform by milling and broaching.

Punchcard-controlled horizontal borer . . .
Russia is extending automation even to horizontal borers. This punchcard-controlled Model 262 PR uses cards prepared in the main control console (extreme right) or individual cards prepared in punch unit in left foreground. Soviet engineers in charge of this exhibit were disappointed that no U S machine tools were on show in the American pavilion

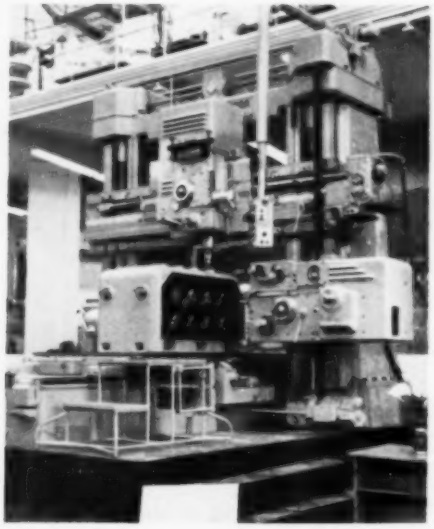
3-D miller . . .
. . . is programmed by magnetic tape operated through a simple transistorized digital computer. This Model 6H 13 PR was developed from a basic knee-type vertical miller

Russian Tools at the Brussels

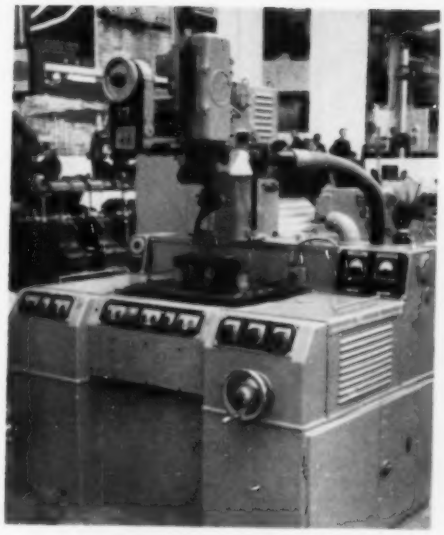
Here are some of the more spectacular machine tools Soviet Russia has been keeping under wraps, holding them back from minor trade fairs in order to make an impressive display at Brussels. Note emphasis on automation



Tape-controlled lathe . . .
Russian Model 1 K 62 punchtape-programmed lathe employs a location stop attached to the tailstock as a datum point for the tool, also incorporates electromagnetic clutches for main slide movements. Commands for certain standard functions, once recorded on the tape, can be stored in a memory device and called up as required without need for respecifying their exact details

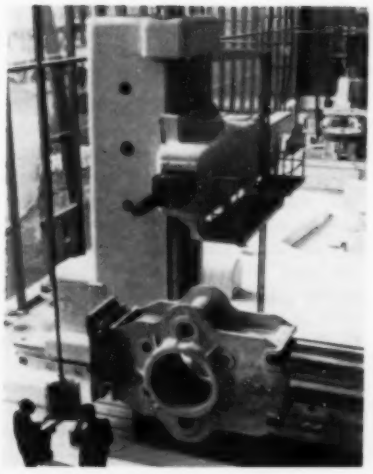


Precison borer . . .
Gantry cross-rail on column, main head on gantry, and cross boring head of column all are optically set, as is 2 by 1.4 meter table. Machining accuracy is claimed to be 0.002 mm



Spark eroder . . .
. . . Soviet Model 473 takes workpieces up to 340 mm by 260 mm, cuts to a depth of 25 mm. Demonstration workpiece was a carbide die for producing a 6-in. frame gap gage

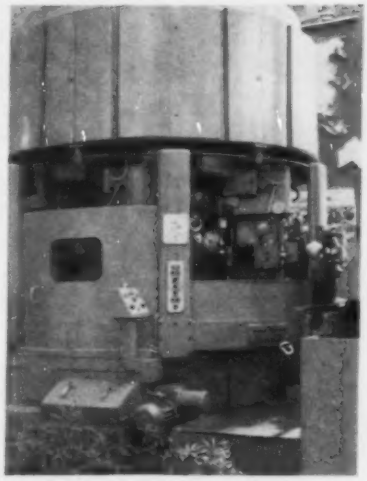
Fair

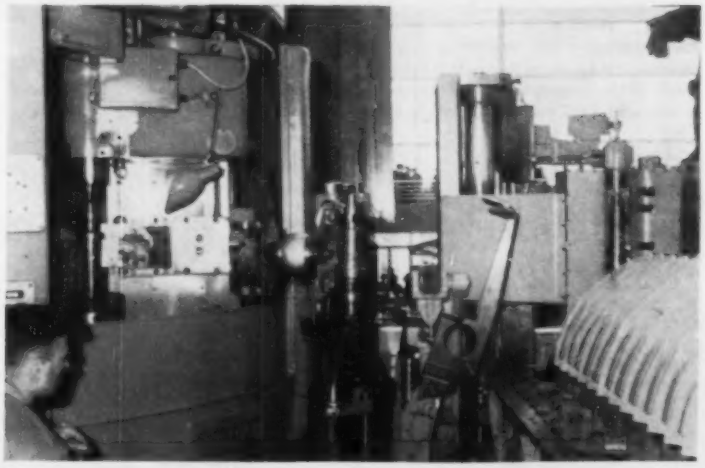


Czech borer . . .
was the largest Communist machine tool shown at Brussels. It has an 8-in. spindle, weighs 58 tons. Powered by a 35-kw main motor, machine is electrically controlled in all motions, speeds and feeds. A pendant control box houses dials and pushbuttons. Maximum boring depth is 80 in., with 64 in. travel on the main spindle housing. Speeds are steplessly variable between 1.6 and 650 rpm. Repeatable setting accuracy is 0.05 mm. Model comes in three sizes, with 6.5, 8 and 10-in. spindles

Russian multi-tool automatic machines gearshafts on 10 diameters...

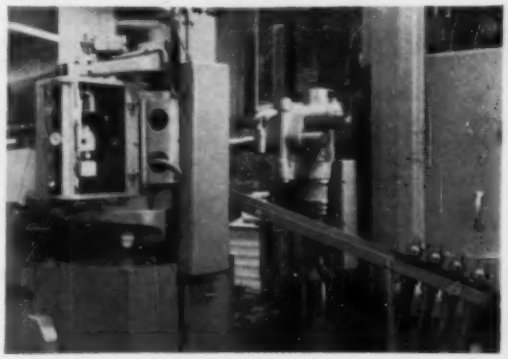
Six-spindle multi-tool vertical automatic shown at Brussels was tooled up to machine auto gear layshafts on 10 diameters, includes automatic loading, and has a double-ended work-transport arm rotating on a horizontal plane and turning the part through 180° in a vertical plane. Machine also has automatic inspection. As machine indexes, a finish-turned shaft reaches load-unload station, doors open and transport arm carrying new forging swings into position to grip finished shaft. Tailstock retracts, chuck is released, and part is swung out of work position. Arm rotates through 180° to bring in another piece, locates it, and carries finished part into electronic inspection unit. After gaging, work is extracted by arm, dropped into exit

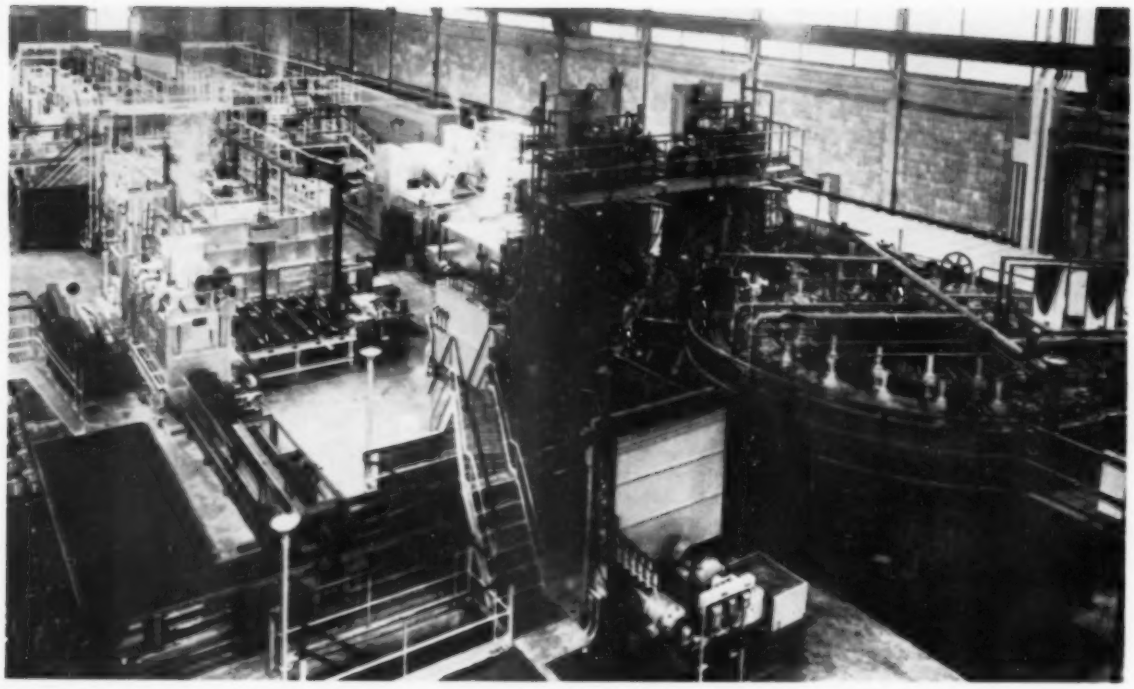




Transfer input conveyor is at right, inspection unit behind it. Swiveling pickup arm swings under input conveyor, carries work to transport arm. Double-ended transport arm (seen end-on with spring-loaded clamps on each side) swings horizontally between load-unload station and inspection unit. It also rotates through 180° to present the appropriate piece to the chuck, the inspection unit, or the pickup arm

Gaging head (left) simultaneously checks three diameters and three lengths. After this, transfer arm picks up part, drops it into exit chute (right). Gaging-head feedback automatically readjusts tooling when the machining limits are exceeded





Automated heat treating . . .
of cups and cones is completely integrated; operates around the clock. Major operations include carburize, high-temperature draw, reheat and final quench. Latter is done with quenching presses hydraulically operated on fully automatic cycles. Rotary hardening furnace (rt foreground) has 44 positions; discharges tray every 2.4 min. For 1450 F, cycle time is 1.6 hr

Breaking the "hot-box" barrier:

Side loader . . .
lift truck transports seamless tubing from storage yard to loading racks of screwmachines. Truck has six-ton capacity; carries load in transit on its bed rather than on the lift. One rack of tubing supplies one machine for an 8-hr shift. Tubes range in size from 6 to 10 in. OD, are from 8 to 20 ft long, and weigh up to 100 lb per ft. By tooling feed racks on screwmachines for longer tubing, Timken has found a sizable saving in crop-end losses as well as in handling time

COLUMBUS, OHIO — Yesterday's steam locomotives stopped fairly often for coal and even more frequently for water. Bearings, mostly sleeve, had a chance to cool; oilers had a chance to check and lubricate. Today's diesels move faster and fuel stops are further apart. Seized sleeve bearings, "hot-boxes," are causing an increasing number of wrecks.

Roller bearings are recognized as the answer to faster, longer, and safer hauls, but so far only about 25,000 out of 2-million freight cars are equipped with them. Why? First, because railroad executives say that as quickly as they equip a car with roller bearings another line swipes it. Second, because most railroads are broke; they can't afford the capital investment necessary to convert.

Timken is betting more than $7 million that both problems will be solved—and soon.

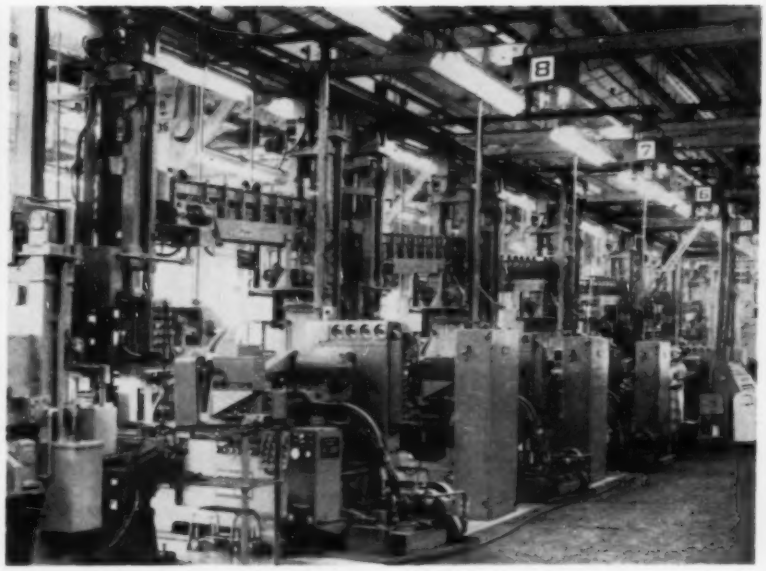
At its Columbus plant, The Timken Roller Bearing Company has taken another step to encourage conversion. Following the Bucyrus concept, including getting the users to compromise on a standard, Timken has automated to produce these roller bearings less expensively. Two buildings, totalling more than 200,000 sq ft, house this new production line, which is divided into three major units: green machining, heat treating and grinding.

Where, formerly, more than 150 people made about 7000 car-sets of these bearings a year, today a total of 26 men make 20,000 car-sets a year. A car-set consists of four complete roller bearing assemblies. The new line is set up for 30 assemblies per hr in machining (5-day week) and 24 assemblies per hr through heat-treat—which operates 24 hr a day and 7 days a week. Five standard sizes of bearings are produced.

In a lot lying between the two buildings which house the production lines, Timken's seamless steel tubing (Krupp steel containing 3.5% nickel, 1.5% chrome and 0.20% carbon) used for cups and cones is stored.

Green machining starts with special 10⅝-in.-dia single-spindle automatic screwmachines designed and built by National Acme in cooperation with Timken engineers.

Trouble finder . . .
developed by Barnes-Detecto acts as a control center for all heat-treat equipment. Because sequential piece-by-piece handling must be exact, and it involves 280 limit switches plus 75 to 85 miles of wiring, two or more switches out could take hours to locate. Now trouble is found in 5 min.



Heat-treated cups . . .
are completely ground in eight separate operations on a line of as many grinding machines. An automatic system handles the heavy cups in such a way between operations that they are not damaged by contact with each other. Also, it provides 30 min. of storage or lag time between machines. Two lines, for cups and cones, are dominated by Heald Centrimatic and Cincinnati Microcentric grinders. Green, yellow, and red overhead lights tell the operator at a glance if a machine is operating, operable but waiting, or stopped and requiring attention.

Timken tools for tripled RR bearing market

Equipped with seven pre-set and pre-ground tools, each machine turns, bores, and cuts the green race from the tube stock.

A second operation machines the opposite end of the piece on a National Acme 12-in.-dia Chuckmatic at 465-475 sfpm. Feed is 0.010 ipr for turning and boring and 0.005 ipr for each of two cutoff tools used in tandem. Coolant is a 6% soluble oil and water solution. Handling between machines is done on automatic, positive overhead conveyors. Chips are carried away from the machines by sluice ways and spiral conveyors. Coolant is separated and filtered.

Heat treatment follows green machining, with the product transferred on pallets to the heat-treat department (because of sequencing differences). Following a somewhat recent trend in ordering, Timken contracted with the Surface Combustion Corp to supply the complete system. All furnace operations are in controlled atmosphere and the product, when ready for grinding, is completely clean and scale-free.

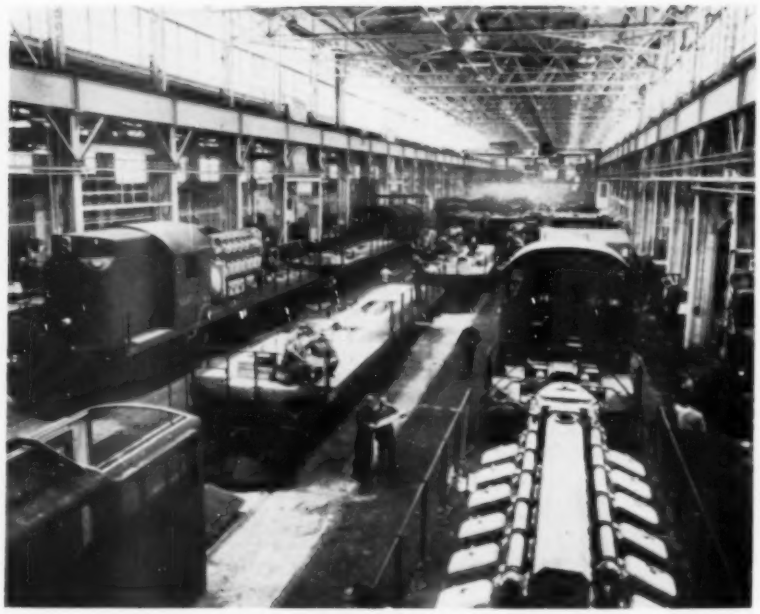
Heat-treated rollers are delivered to the grinding line where a spiral-elevator feeder delivers them to the Cincinnati No. 3 centerless at a rate of 38 per min. After two body-grind operations, the ends are ground on a Gardner No. 84B. Two more body-grind operations complete the piece.

Cups and cones are individually loaded, manually, into a storage conveyor (a 30-min. supply) ahead of the first grinding operation for each part. From this point on, the conveyor system provides automatic handling and positioning through the grinding operations and to the inspection and assembly area. In-process gages, supplied by Federal Products and Moore Products, check part size and compensate for wheel wear at each machine. Manual gages are provided at each station for quality control checks by roving inspectors.

After inspection for visual defects and final gaging, cups and cones go through an automatic phosphating operation. Finally, they are reinspected, assembled, greased, packed (with auxilliary equipment) in a box and palletized for shipment to finished stores.

Photo-electric surface inspection . . .
of finish-ground rollers has shown tremendous results over manual visual inspection. Roller is rotated at 5000 rpm, advanced 0.030 ipr, and brightly lighted. Light from an area 0.002 in. wide by 1/32 in. long is magnified 20 times on to photocell. Any flaw this size or larger rejects piece

Eighty percent of world locomotive export was the record chalked up by Alco last year, in competition with foreign manufacturers. This year Alco hopes to do even better with...



Straight-line locomotive output

SCHENECTADY, N Y—Semi-mass production and semi-standard design are Alco's answer to foreign competition in the world market for diesel-electric locomotives. And now, with the opening of a new, 119,000-sq-ft straight-line assembly plant—the only one of its type in the world—the company hopes to improve its competitive position still further.

Always a leading factor in this field, Alco last year captured nearly 80% of the export locomotive business in spite of the low labor rates enjoyed by foreign manufacturers.

Builders in other countries will often make a locomotive to the customer's own design and specifications. Thus, each order is a first-time proposition, and the expenses of getting the job started usually outweigh the low labor cost.

Alco operates on the basis of standardization. As one company official states, "We don't build any freaks." Even the modifications are standard. However, it's a flexible standardization because of the varying requirements of railroad customers all over the world.

From the manufacturing viewpoint, there are only three basic designs, but almost every order involves a number of modifications. And the product is so large—79 to 165 tons—that the annual output is numbered only in the hundreds.

In addition, Alco offers a "remanufacturing" service. Old locomotives are disassembled and cleaned, and the parts are repaired, rebuilt, or replaced, all for about 50 to 70% of the cost of a new unit. The special advantage to the customer is that only a portion of the cost has to be capitalized for long-term depreciation. The remainder can be charged off as expense.

But from the manufacturing viewpoint again, these units add to the problems. They are reassembled on the same assembly lines as the new ones, and many of their own original components must catch up to them at the proper station on the line.

New assembly layout

A progressive-station assembly line to handle all these variables must be extremely flexible, and the flow of parts and materials must be closely controlled and coordinated. As part of a general modernization program, the company started from scratch to plan and develop "one of the world's most modern and efficient locomotive-production operations."

Eight months ago, Building 62 in Schenectady was stripped to the bare shell to provide an area 1190 ft long by 100 ft wide for the new layout. Today, locomotives are moving down the progressive assembly lines from one station to the next, starting with basic steel plates and ending up with finished and painted, ready-to-go units.

The building is laid out so that materials and parts flow into the shop at designated side-bay and center-bay areas and move to the proper assembly point with a minimum or handling. In general, the major assembly takes place in the center bay and is supplied with parts and subassemblies made in the side bays.

In the first half of the building, floor frames and side trusses are fabricated in the center bay. Pipe preassemblies are produced in the right-hand bay.

At the center of the building there is a main transverse aisle where diesel engines, hoods, cabs, and trucks are brought in on dollies. Beyond this point the locomotives proceed on one of three tracks through the final stages of assembly.

Flanking the center bay on the left is the electrical wiring section where contactor panels and control stands are put together. On the right, tubing and pipe are cut, bent, threaded, and welded into the parts and subassemblies that will be needed for the units coming through the line.

After being painted, the locomotive moves to two water-box stations to be tested and checked under varying load conditions. It is then ready for delivery.

It may not be true mass production, but Alco plans to make the most of its own type of semi-mass production.

WANTED: an hour for lunch

Here is a strong dissent from the standard blitz lunch on the production line. Take a look at the case Mr Raisglid makes and tell us what *you* think

WILLIAM RAISGLID

One important aspect of worker safety has been left completely untouched: fatigue traceable to an overshortened lunch hour. In many plants and shops all over the country workmen are allowed only half an hour for lunch. This policy is established by the employer without interference from labor or government authorities. Most employees prefer to go home a half hour earlier, and can do so because of the short lunch hour.

That this practice is detrimental to the worker's health can be shown by a brief illustration of a typical lunch period, which I have actually observed. Getting washed for lunch, walking to the plant canteen or cafeteria, or setting up a suitable place to eat consumes 8 to 10 minutes. This leaves approximately 20 minutes in which the worker must gulp his food and then get right back to work. Often when the bell rings to signal the end of the half-hour, the worker is already on his machine, swallowing the last bite of his lunch. There is no time for digestion and the minimum relaxation which are so important after a half day of hard work. The results may lead to indigestion, eventually perhaps to ulcers, stomach disorders, nervous disorders, and fatigue, all of which contribute to reduced mental efficiency. This, in turn, promotes carelessness, which in turn causes accidents in plants and machine shops.

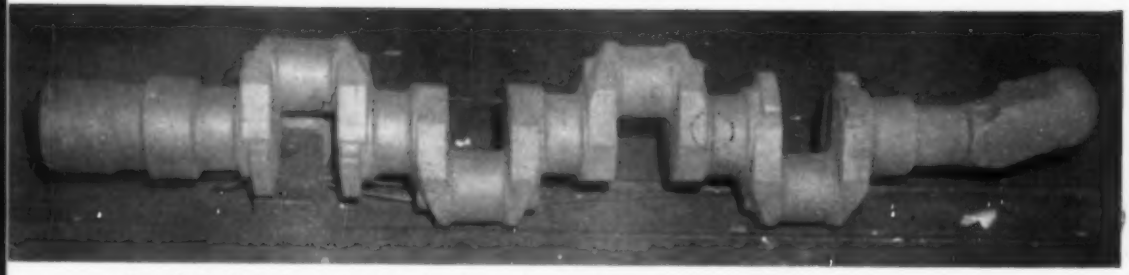
The most frequent accidents in a machine shop — like cut hands, mashed fingers, breakage of machine tools, jigs and fixtures, spoilage of production—occur in the afternoon, and statistics indicate that they increase after 3 o'clock. By that time the worker is overtired and exhausted. In contrast, it has been demonstrated that where there is a coffee break in the middle of the shift, accidents diminish after these breaks, when production is eased up: This shows that a few minutes of relaxed refreshment mean a great deal.

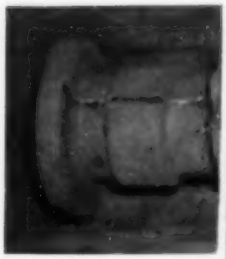
Besides causing accidents, continual exhaustion of workers leaves the door wide open for prolonged serious, sometimes fatal, illnesses. Again, statistics show that prolonged illnesses annually strike 39 of every 1000 men on the payroll. The average absence from work because of prolonged illness is a little more than 10 weeks. Production lines are hardest hit, and experienced workers, whose skills can least be spared, are most frequently absent.

Most physicians agree that proper rest is as essential to good health as exercise, food, recreation, sleep, and peace of mind. Nervous stress and strain can be prevented by regular rest periods. Digestion and rest often help to induce a calm state in the nervous system more than any medicine, especially to those who have reached middle age. It has often been said that an hour's rest will do more for an overtired worker than a gallon of medicine.

An army of people in poor health, whose talents are being wasted, can be used profitably and happily when conditions in the shop are improved. Persons who suffer from cardiac trouble or other similar ailments may still be able to do light work. Very often these people have many years of experience which could be invaluable to employers. Also, these unfortunate people would derive much satisfaction from knowing they are still useful. Too many people today fear that their working days are coming to an end, because the long hours mean undue physical strain and health hazards that they can't endure.

Proper steps should be taken by all companies to set up longer lunch periods and work breaks that will bring increased benefits for the employer and his employees. Actions sparked by industry with the cooperation of groups in labor, management and the medical and health authorities, can surely prolong the life of the American worker. Otherwise, the good health of our manpower is at stake, and so is the good health of Industry!





Crankshaft is hot twisted after being forged, eliminating the need for locked dies. This 10-ft, 3480-lb crankshaft (left) is first forged in a closed die. A second step upsets the flange on one end and trims the other. Then the throws are hot twisted

Large drop hammer makes

50,000-lb steam hammer applies closed-die forging technique to parts that formerly had to be made by flat die forging or by casting. Results: less metal wasted in machining and greater strength in parts

GEORGE H DeGROAT,
Detroit editor

Huge forgings, weighing up to 5000 lb, are now being held to commercial tolerances with as little as 3/16 in. of stock left for machining. A new 50,000-lb steam hammer at Park Drop Forge Co in Cleveland—coupled with Park's closed-die technique—is pounding out this almost-precision work on giant parts that previously could only be rough forged.

Only five such steam hammers are in existence in this country—all built by Erie Foundry Co in Erie, Penna. The other four are owned by the US Government and have somewhat different ram construction. This one has a nominal 52,000-lb falling weight, rated by combining the weights of the rod, ram, and piston head. To this is added the die weight, usually about 20,000 lb, to give a falling weight of 72,000 lb. In operation 150-psi steam pressure is applied to a 36-in.-dia cylinder. The energy of the blow is varied, of course, to suit the job at hand.

Crankshaft strength is increased . . . by directionally worked flow lines which provide a high degree of grain refinement and density where stress on shaft will be greatest

TYPICAL PARTS

Some of the parts forged in this hammer are large crankshafts, connecting rods, top deck forgings, racks, frame members, and other parts for diesel engines, stationary generators, and similar equipment. Dies for the work are made by Park Drop Forge Co from forged, hardened, and ground hot-working alloy steel. Die blocks for some of the forgings are as long as 175 in. with widths running to 42 in.

Another example of the work produced by the hammer is a rack for a glass-polishing machine. This part weighs 2310 lb and is 61⅛ in. long, 17⅜ in. wide, and 10⅜ in. thick. Also typical is a 3,800-lb, 6-throw crankshaft, 125 in. long. Pin dia is 7¾ in., main bearing dia is 9 in., and the web is 11¼ in. thick. Another crankshaft weighs 3480 lb. Overall length of this 8-throw shaft exceeds 128 in. These parts are heat treated in long, continuous furnaces to the customers' specifications.

PHYSICAL PROPERTIES

Strength and toughness are gained in closed-die forging, because the grain pattern inherent in a hot-rolled bar or billet is directed to conform to the size and shape of the forged part. Hot working and controlling the direction of grain flow improves physical properties of the steel. Torsional strength and impact strength in particular are greatly increased. With the 50,000-lb hammer these advantages of the closed-die technique are obtained in parts that previously could be made only as flat die forgings because of their size.

A special process at Park Drop Forge is the hot twisting of crankshaft throws into position relative to each other after forging instead of forging them in place. This has the advantage of providing continuous, even grain flow throughout the length of the forging. The twisting is done in special machines developed at Park some years ago.

SECTIONAL FORGING

Another technique employed at Park increases the flexibility and extends the scope of closed-die forging by making the parts in sections and then welding them together. With this method, crankshafts with any

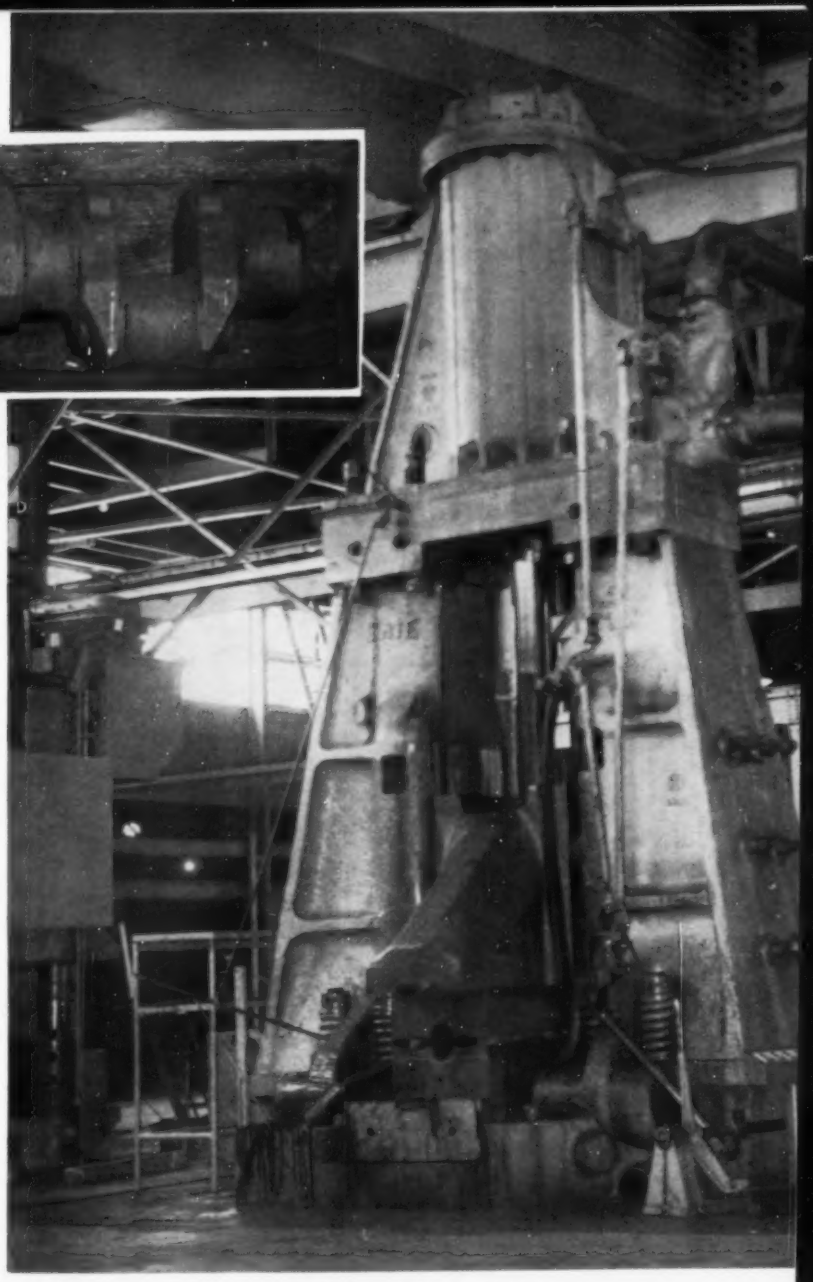
into proper relative positions to produce the completed part (right)

better parts

number of throws can be made from just three sets of dies. There is one set for the front end of the crank, a set for the rear end, and a set in which the throw can be formed. So long as the bearing size and stroke are the same, any number of crankshafts with the desired number of throws can be made from these three sets of dies, with the sections flash butt welded together after they have been forged.

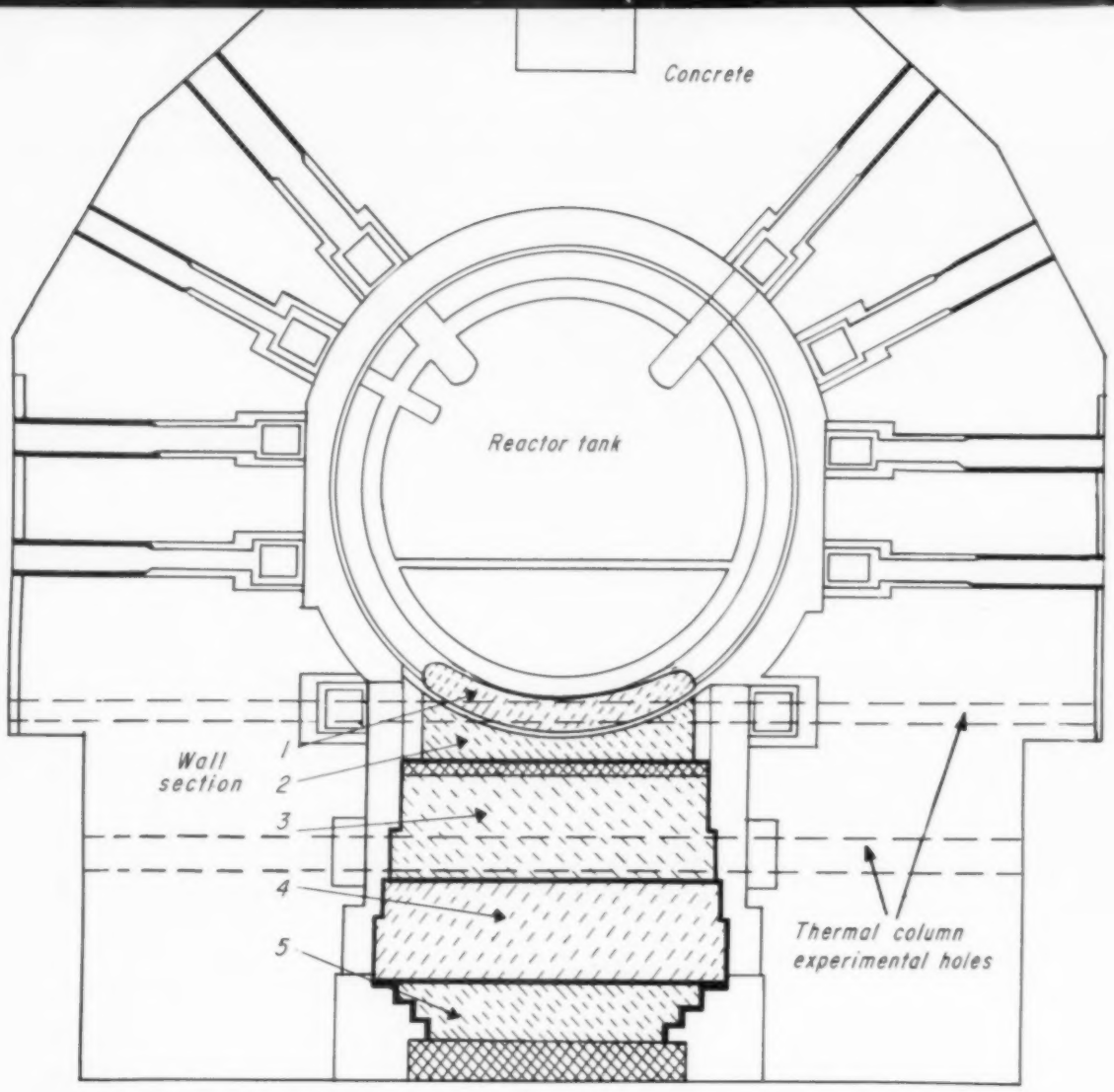
For example, an engine builder may want a number of different crankshafts of four, six, eight, twelve, or sixteen throws, but the volume of any one crankshaft may not warrant the purchase of separate sets of dies for each crank. Or possibly the crankshafts in question are too large to be forged in one piece. Both of these problems are solved by sectional forging.

Another application of this technique, combined with closed-die forging in the 50,000-lb hammer, paid off in making various sizes of top decks for stationary diesel engines. These parts were once too large for forgings, and were cast. Frequently, however, internal flaws showed up only after hundreds of dollars had been spent in machining. In addition, different size patterns had to be made for each engine size. Now, sectional forgings weighing about 1400 lb each are made in the big hammer and are welded together as required.



Big hammer extends range of closed-die technique . . .
and produces huge parts with maximum strength and minimum excess stock. The unit is about 13 ft wide and 27 ft high. Below floor level, the 12-ft-high steel base is supported by 16 ft of reinforced concrete

Closed dies for big crankshafts weigh about 10 ton . . .
About 3/16 in. of machining stock is left on a typical shaft, well below the amount of stock left by flat die forging



NRU reactor has five graphite wall sections . . .
all nested together to form thermal column that slows down neutrons to working speed. Front experimental holes go through sections 1 and 2

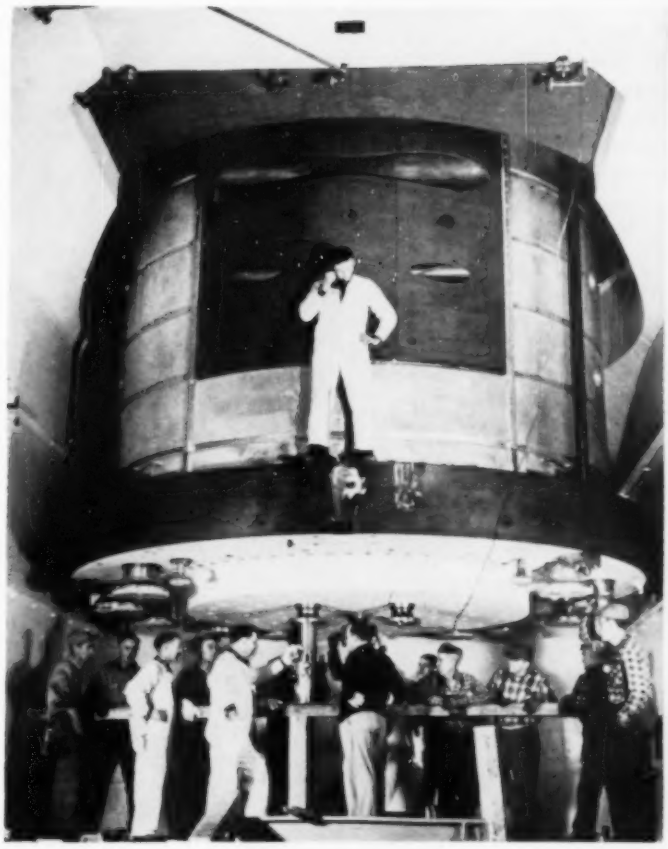
Clean-machined graphite for Chalk River

EDWARD J KLEBER,
National Carbon Co Div,
UNION CARBIDE CORP,
NIAGARA FALLS, N Y

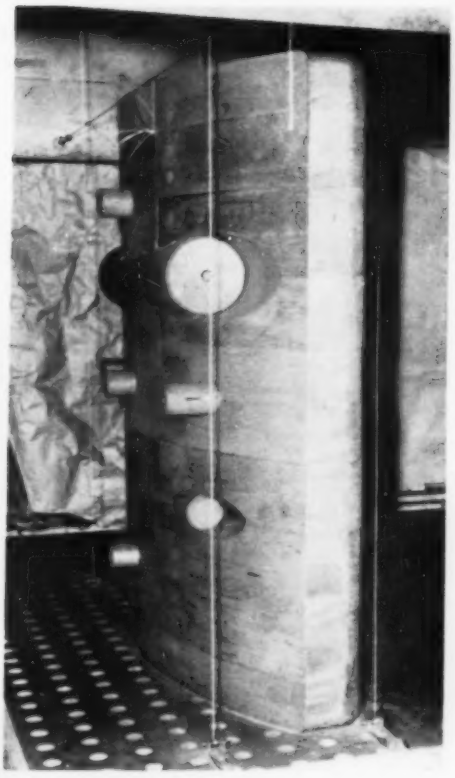
Machining graphite wall sections for an experimental atomic reactor had some unusual sidelights:

- Cleanliness was all-important—millers, lathes, and saws had to be degreased and fitted with awnings to keep greasy dust from settling on the work, and overhead hoists were "diapered" to prevent dripping. Finished blocks were wrapped immediately to prevent soiling.
- Wall sections were assembled temporarily for machining with 1¼-in. steel strapping with wood blocks at the corners so the graphite would not crumble.
- Inspection after assembly—to tolerances of 0.010 to 0.030 in.—was done with CI stress-relieved surface plates and stretched nylon cords, located with transit and micrometers.

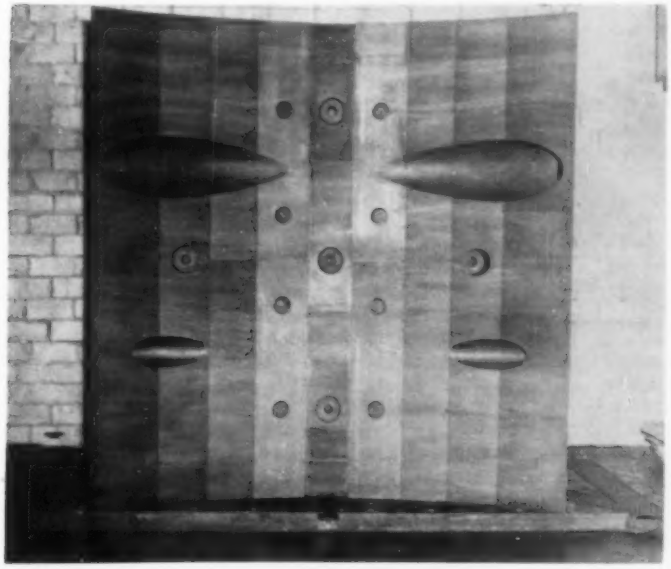
Some 1300 pieces of graphite (50 tons) were machined and assembled to form a five-section wall for Atomic Energy of Canada's 200,000 kw NRU reactor at Chalk River. Job was done by National Carbon Co because equipment and technique were available there.



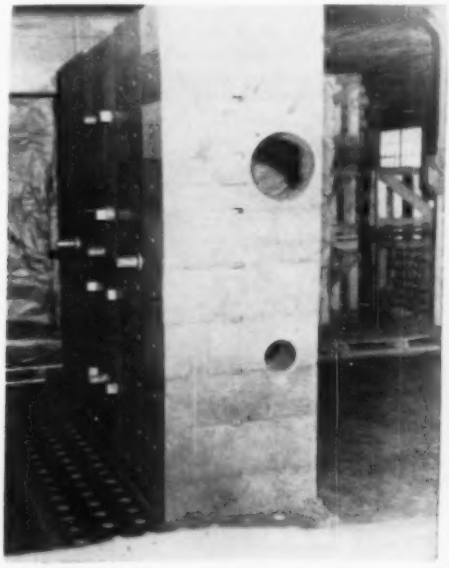
Reactor tank is assembled . . .
with No. 1 wall section as an integral part. No. 2 wall section mounts against this wall with a 1-in. space between to allow drafts and clearance when tank is lowered into sub-basement. Face was held to 0.010-in. machining tolerance



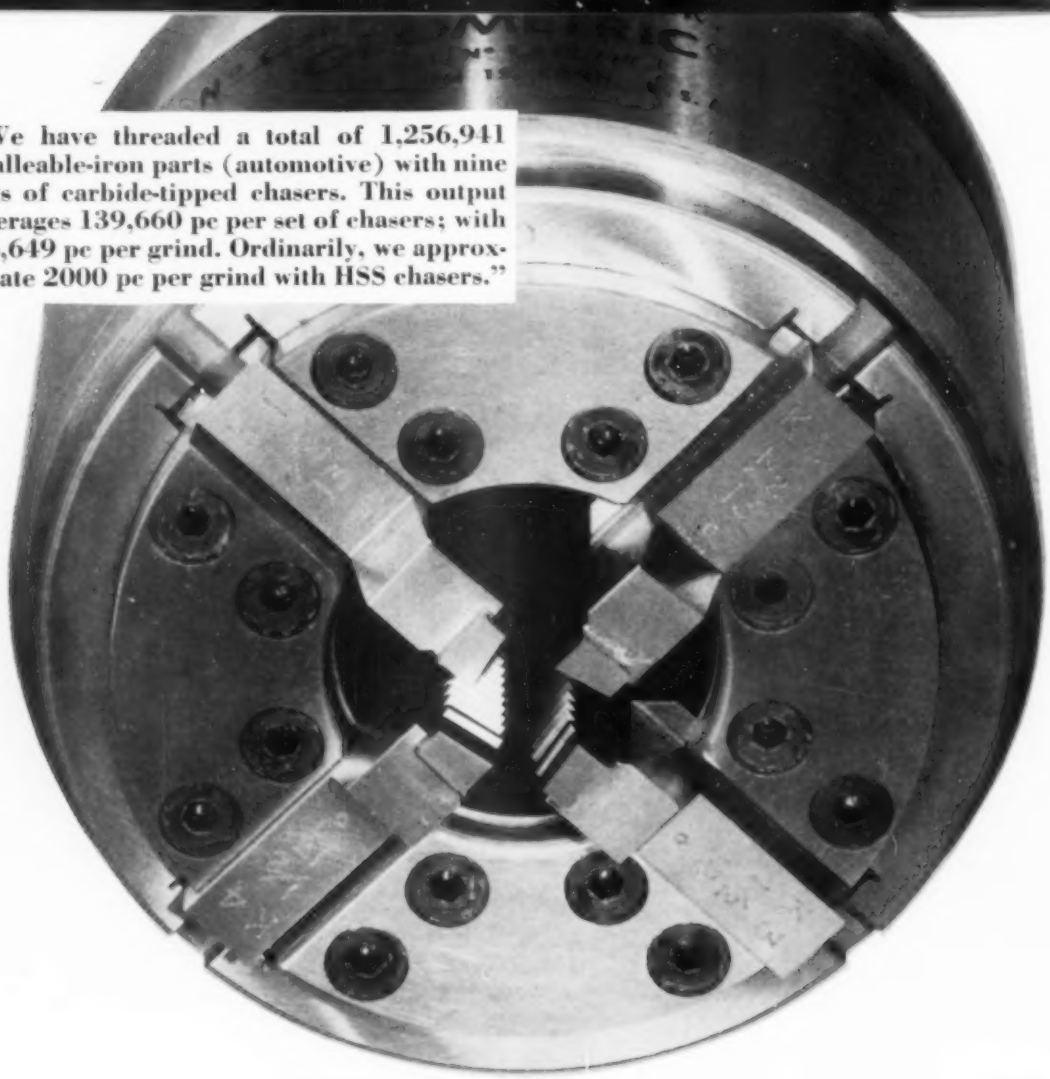
First section has 30 graphite blocks . . .
machined to curves front and back to match reactor tank. Graphite plugs are inserted in the 12-in. and 6-in. holes. Dimensions are checked with iron surface plate underneath and nylon cords stretched vertically



Second wall section has concave face . . .
to fit first section, plus continuations of 12-in. and 6-in. experimental holes. Wall was assembled over central hole in surface plate that acted as reference point



Back of No. 2 wall is flat . . .
to fit remainder of assembly. Pins line up with holes drilled in face of No. 3 section. Other holes are for location and for thermocouples. Some inside holes were enlarged with collapsing recessing tools



"We have threaded a total of 1,256,941 malleable-iron parts (automotive) with nine sets of carbide-tipped chasers. This output averages 139,660 pc per set of chasers; with 54,649 pc per grind. Ordinarily, we approximate 2000 pc per grind with HSS chasers."

Dieheads . . .
equipped with carbide-tipped chasers, previously thought impractical, now offer outstanding production advantages. New grades of carbide provide the strength needed to overcome the loads imposed on these cutting tools. Another threading bottleneck is broken

Carbide chasers open new threading horizons

WILLIAM M STOCKER, JR, associate editor

Production men long have seen the potential advantages in carbide chasers for dieheads and collapsible taps, but until recently their application has been impractical. Carbides were too sensitive to shock. Breakage lowered otherwise long tool life to the point where the cost was prohibitive. Now, improved carbides plus a better knowledge of tool holding are giving carbide chasers many advantages.

Royce M Strickland, Chief Engineer of Geometric-Horton Div. of United Greenfield Corp says that more than five years of development and testing, including use by at least 100 customers, have proved beyond doubt that the chasers are practical for production. Some of the materials threaded with carbide include cast iron, cast and bar brass, cast and bar bronze (including silicon-bronze), glass-fiber resins, glass rod, cast and bar aluminum and aluminum alloys, heat-treated alloy steels, and Types 303, 347, and 321 stainless steel.

Carbides have been highly useful with the more abrasive materials. For instance, included oxides in some aluminum die castings, or sand inclusions in sand castings, rapidly ruin HSS chasers. Carbide does the job with little difficulty. Similarly, tests show that if a tooth chips on a HSS chaser the tool loads and jams or breaks—with carbide you keep right on cutting.

"Carbides, nevertheless, are not a cure-all," comments Mr Strickland. Steels should be R_c 25 to 32 for car-

bide threading. Soft materials, such as CRS and alloy steel in the annealed condition or soft steel stampings, cause build-up or galling on the teeth, and chipping results.

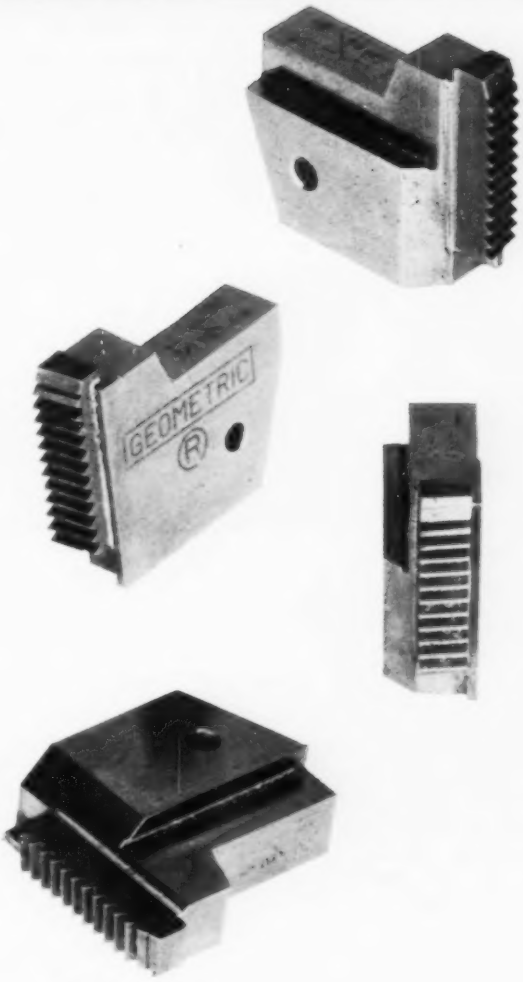
Interrupted cuts caused by keyways and cotter-pin holes, for example, also cause chipping and should be avoided. While chipping is not as serious with carbide as with HSS chasers, and in many cases will not interfere with accuracy or finish, it is never an acceptable threading condition. Ultimately, tool life suffers. Rarely is wear a critical problem as compared with chipping.

The tool-life ratio of carbide to HSS is 10 to 1, and sometimes as high at 25 to 1. Thus, while the cost of carbide chasers appears high, the tool cost per piece is considerably lower when carbide is properly applied. An additional gain is found in the increased number of pieces threaded per grind.

Every set of chasers is engineered for the job to be threaded, to suit thread specifications, material, and threading conditions. Clearances and cutting-face grinds are specifically selected for the part. For example, stainless steel and SAE 4140 are threaded with chasers having a very slight positive rake.

Based on the performance of the first collapsing tap tested, one automotive plant (one of the big three) has recently installed six collapsing taps with carbide-tipped threading chasers in its automated lines. Ratio of pieces per grind, as compared to HSS, is better than 25 to 1. Saving in downtime to change chasers has resulted in additional production.

Another company used carbide chasers in a diehead to externally thread glass-fiber reinforced resin rods. Thread sizes were 7/16-28 and 9/16-18. At 30,500 pcs per grind, performance of the carbide chasers was six to seven times better than with HSS. One customer is using carbide chasers to put a 1-72 thread on solid-glass rods.



Carbide tip . . .
is silver brazed to chaser's steel shank. Chasers are readily resharpened, following conventional carbide practice using a diamond wheel

HOW TO USE CARBIDE CHASERS

Certain ground rules must be followed by the user seeking the most efficient results from carbide threading tools. Mr. Strickland recommends these procedures:

Machine conditions must be such that the work is held securely, with no slippage. The machine tool should be in good condition, although the degree of perfection varies with the job to be threaded. One or two successful applications are operating under very unfavorable machine conditions. Unwarranted fear that their machine quality is unsuitable keeps many people from using carbide chasers who might find considerable profit in them.

Machine power must be ample to do threading at the higher speed ranges. On two-speed motors, hp should be checked at the higher speed ranges. Speed and power are primarily critical in determining full cutting efficiency—to utilize the value of carbide. With lower power threads can be cut at slower speeds.

Speeds, for brass, aluminum, hard rubber, fiber, and similar readily machinable materials, are unlimited. Generally, for other materials, start with 200 or more, sfpm, depending upon machine and job conditions. Usually, it is safer to run faster than slower. For example, both SAE 4140, heat treated to R_c 32, and SAE 1035, heat treated to R_c 28, are successfully threaded at 290 sfpm. Several installations are threading cast materials using carbide-tipped chasers at speeds formerly used with HSS.

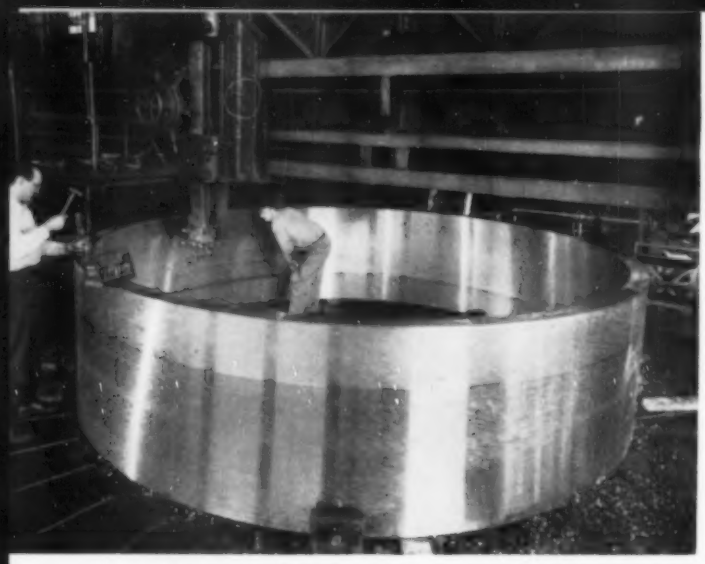
Dieheads, for most of the work done so far, are Geometric's KH-2 or KD style, because the chasers are well supported and freedom of chaser movement is minimized. Tools of this type are strongly recommended, especially for threading tough alloy steel, stainless steel or forgings, because of the high cutting stresses in these materials. Carbide-tipped chasers are easily chipped when dropped, or if they strike each other, hence they should be protected at all times and carefully handled during setup. Similarly, extra precaution should be taken when threading close to a shoulder, to prevent jamming.

Chamfers should be as long as possible. Because, as in using HSS, the chamfer does all of the work, short chamfers will result in an increased tendency to chip when carbide is used. A 15° to 22° chamfer is preferable. The 33° and 45° chamfer should be avoided where this is possible.

Coolant, usually soluble oil, must be flooded onto the work area or not used at all. Use enough coolant or none. Also, start the coolant flow before cutting and stop it after threading is completed, to avoid thermal shock.

Sharpening is accomplished as with HSS chasers, except that a diamond wheel should be used. Careful honing, after sharpening, will add materially to chaser life—HSS or carbide—but for carbide the multiple of improvement is a more significant figure.

Carbide chasers are establishing impressive records for high production, with a minimum of downtime. Thread quality, too, is outstanding. No longer a laboratory curiosity, carbide chasers are worth considering as a further step in reducing shop costs.



Eleven-ton gear-tire blank . . .
is machined (see cover) from the forging on this 20-ft-swing boring mill. OD of ring is 170 in. After machining, part is heat treated to uniform hardness. Parts are produced at Bethlehem Steel Co, Bethlehem, Pa.

Heat-treat dominates gear-tire output

Gear tires—also called gear rims and gear rings—are large steel rings with herringbone teeth machined in their perimeters. When gear tires are made from ingots by forging and machining, heat treat plays an important role in providing the strength for marine propulsion. Before gears are cut, tires are welded to steel hubs.

Unusual forgings produced to rigid specifications, gear tires vary in diameter from 3 to 15 feet, with rim thicknesses ranging from 2 to 6 inches. Tire widths are from 2 to 4 feet. Before machining, a forging may weigh as much as 30 tons. As finished, the tire may weigh only half that much.

Many different grades of steel are used, from simple carbon steels to alloys containing one or more of the elements nickel, chromium, vanadium, and molybdenum.

After casting, the ingot is allowed to solidify. It is removed from the mold while still hot and heated in a furnace to forging temperature.

In general, large pieces are press-forged in open dies, with a series of alternate heating and forming operations. Forging produces the desired shape, refines the structure, and consolidates the center metal. Presses, which must have sufficient capacity to work the metal throughout its entire section, are either straight-hydraulic or steam-hydraulic. Capacities range from 3,000 to 14,000 tons. Throughout the entire forging operation, surface defects or tears are removed by scarfing as the work progresses.

When a gear-tire ingot arrives in the forge shop it is placed in a furnace, equalized at the received temperature (usually 1200 F), and then heated to and uniformly soaked at the forging temperature, about 2250 F. Next the ingot is forged to reduce its diameter and elongate it, to refine the structure preliminarily and to heal any slight porosity in that portion of the ingot which will remain a part of the finished forging. Top and bottom metal are cut away with hackers and flame-cutting torches, to eliminate any injurious effects of mold splashing, cone effect resulting from the intersection of chill crystals, or segregation entrapped by the fast chilling. Similarly, removing top metal eliminates the sinkhead, primary pipe, and top segregation. Total top and bottom metal discarded may exceed thirty-five percent of the entire ingot.

The cylindrical block of clean steel is reheated and held at forging temperature, and then upset until the diameter is about double the length. Then a hole is punched in its center and a mandrel is inserted. Next the piece is forged circumferentially until the center hole and the outside diameter reach the desired dimensions. Press work is planned so that a forging is finished only slightly above the transformation range of the material to produce a finer structure.

Heat treat for structure

When forging is complete, the piece is given a preliminary heat treat, to provide good machinability and uniform grain structure. Shot blasting or other methods remove the scale. At this point it is inspected for size and shape and, if satisfactory, is sent to the shop for machining.

The forging is machined on a vertical boring mill and excess metal is allowed for testing, scaling, or any warpage which might occur during final treatment. Machining helps to improve quenching results, because all non-essential metal is removed and a clean, uniform surface remains.

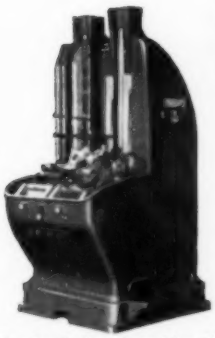
Final heat treatment consists of water quenching from a temperature above the transformation range, and tempering to produce the final mechanical properties. The large surface area of the outer circumference, where the teeth will be machined, calls for uniform hardness through the entire rim section. Special quenching tanks, designed to give uniform water flow, are used. Upon removal from the quenching-tank temperature checks, to assure uniformity, are taken at numerous places on the tire. After quenching, the tire is immediately equalized at a low temperature to cause complete transformation of any remaining austenite.

Finally, it is heated slowly and uniformly to the tempering temperature and held for a specified time. Numerous thermocouples are used to insure uniformity.

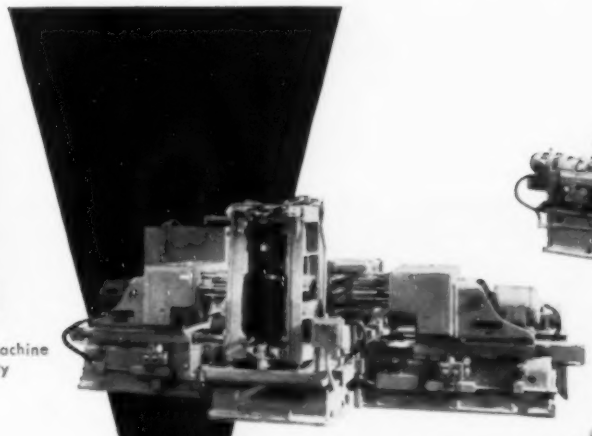
After completion of treatment, the tire is tested for hardness at many locations. Analysis checks are taken.

With tests satisfactorily completed, the forging is sent back to the machine shop for machining to the customer's drawing sizes. Before shipment, hardness tests are again taken to make sure that no changes have occurred in final machining.

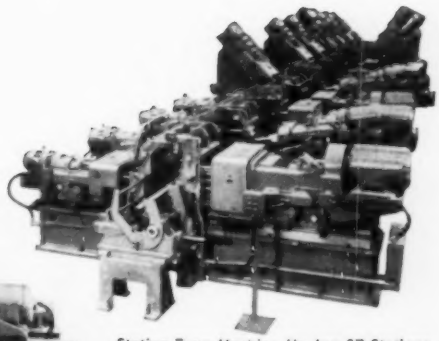
Actual cutting of the teeth is usually done by the manufacturer of the final gear-reduction assembly, for specially designed machines, working to very close tolerances in temperature controlled rooms, are required.



Duplex Surface Broaching Machine
5, 10, 15 and 25 Ton capacity

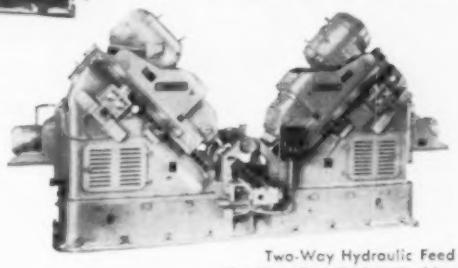


Three Way, 63 Spindle Central System Type, Hydraulic Feed, Horizontal Drilling and Boring Machine with Hydraulically Operated Fixture in Loading Position



Station Type Machine Having 27 Stations, 139 Spindles for Processing a V Type Automobile Motor Cylinder Block

Single Slide Broaching Machine
5, 10, 15 and 25 Ton capacity

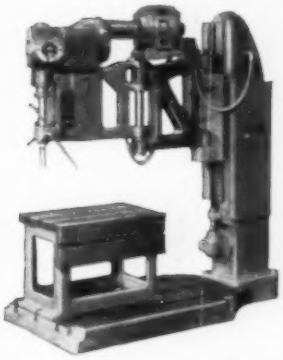


Two-Way Hydraulic Feed
Vee Type Stub Boring Machine

FOOTBURT

line of production machines

1, 2, 3, 4 and 6 Spindle
Sensitive Drilling Machines



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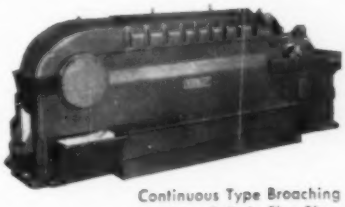

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REFERENCE BOOK SHEET

Tests for Soluble Oils—I

ALAN B MYLER, chief engineer, Metalworking Oil Dept, SUN OIL CO, PHILADELPHIA

The most important property of a soluble oil is that it must emulsify with water. The degree of emulsion stability that is necessary may vary. Grinding emulsions usually must be stable and show no oil separation or creaming. Emulsions for machining can usually tolerate less stability.

ASTM Technical Committee K on cutting fluids decided in 1947 to develop a method for evaluating the stability of soluble oils in various emulsion concentrations and in waters of varying degrees of hardness. Emulsions were made in a graduated cylinder and allowed to stand for varying lengths of time. Some oils separated free oil, some separated no oil but a thick cream. Others separated a thin cream and some separated both cream and oil. The results were not reproducible.

The method finally developed, ASTM Method of Test D1479-57T, describes making test emulsions with a "Mixmaster"-type stirring apparatus. The emulsions thus made are poured into a separatory funnel to stand for 24 hr. No attempt is made to measure the amount of oil or cream flotation. The bottom 20% (25 ml) is removed and the oil content is determined. The amount of oil separation is calculated by difference from the amount of oil originally in the emulsion and the amount of oil remaining in the bottom layer after a 24-hr period.

IMPORTANT PROPERTIES OF SOLUBLE OIL EMULSIONS

Property	Test Method
Emulsion Stability	ASTM D1479-57T
Emulsion Concentration	ASTM D1479-57T
Foaming Test	ASTM D1479-57T
pH Value	Beckman or Coleman pH meter or pH paper
Alkalinity or Acidity by Titration	See Appendix Note ≥ 4
Corrosion Tests:	
Steel Panel Test	See Appendix Note ≥ 5
Cast-Iron Plate Test	See Appendix Note ≥ 6
Cast-Iron Chip Test	GM*
Extreme Pressure Tests	Falex EP testing machine

*Delco Cast Iron Chip Test, Delco Division, General Motors Corp

CHECK AGAINST SHOP CONDITIONS

From a practical standpoint this quantitative procedure need rarely be used. Most shop people are only interested in checking the emulsion stability in a qualitative manner, using the same water, oil, and oil/water ratio in current use.

To do this, use the mixing techniques outlined in the ASTM test, and the same oil/water ratio or emulsion concentration used in the shop.

After preparing an emulsion in this manner, observe its frothing characteristics, cover the beaker with a watch glass to stop evaporation, and allow it to stand for 24 hr. The amount and type of separation, if any, can then be noted, and you can then decide if the emulsion is satisfactory or not.

FOAMING TESTS:

Emulsions of soluble oils may tend to foam excessively. This happens more frequently in soft-water areas, but may also be caused by certain machine tools that have a tendency to beat air into the emulsion. Excessive foaming may force shut-down of the machines and retard production. Most US Government specifications include a foaming test on emulsions, but a more practical test is essentially a part of the ASTM test although it is not so specified.

When oil and water are mixed in a beaker, with a Mixmaster-type beater, foam will be formed. If the foam overflows the beaker, its amount is excessive. Any foam formed in the mixing operation should subside after standing 2 min, leaving only a few bubbles around the edge of the beaker and none in the center. This simple, practical test takes no additional time, because it is run in conjunction with the emulsion stability test.

Concentration is one of important tests to be run on emulsions. It is largely a control test of shop emulsions to determine the oil/water ratio or the percentage of oil in the emulsion. Uniform shop results depend on the use of emulsions which are uniform in oil content. The oil content of large central emulsion systems is usually checked every day, and sometimes more often in large plants.

The procedure for separating the oil from the emulsion is also described in the ASTM Test for determining emulsion stability. Briefly, a sample is put into a Babcock flask, acid is added to break the emulsion, then the flask is put on a centrifuge and spun. The free oil rises into the graduated neck of the flask where it can be accurately measured.

A simpler method, which is not as accurate and which takes a longer time, employs a 100 cc graduated cylinder with a glass stopper. Place 90 cc of emulsion in the cylinder. Then carefully add 10 cc of concentrated sulfuric or hydrochloric acid, shake, and allow to stand until all the oil separates. It will take from an hour to overnight to obtain a clean separation of the oil.

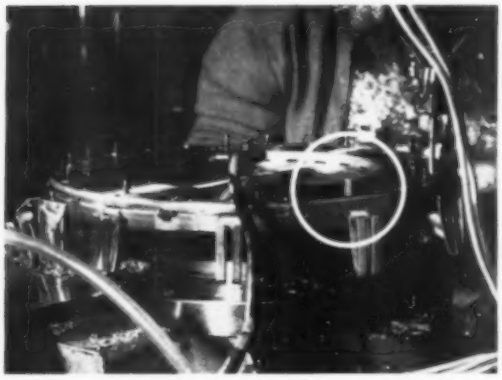
pH OF EMULSIONS

pH is the measure of the degree of alkalinity or acidity of soluble-oil emulsions. Most emulsions in

Practical Tooling Tips

No. 3 of a series

Are your tool makers wasting time making complicated tooling gadgets when a standard, off-the-shelf Vlier part could do the job much better? Why not examine your present drawings and see where these simple, low-cost parts can be used. You will be amazed at the savings possible.



PRODUCTION INCREASED 300% when this 12-station automatic indexing and tapping fixture was put to work. Vlier Spring Plungers allow the operator to load by simply pushing the part into a slot. These simple, spring-loaded tools also position the part for the tapping operation. Available in four models; fifty sizes.

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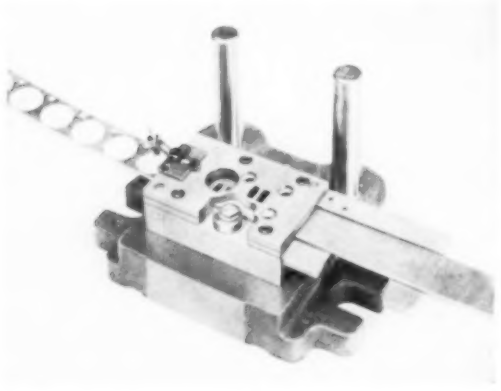

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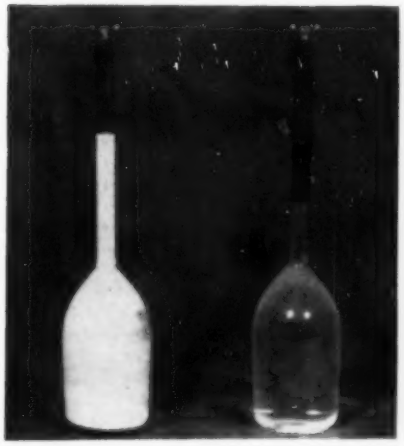
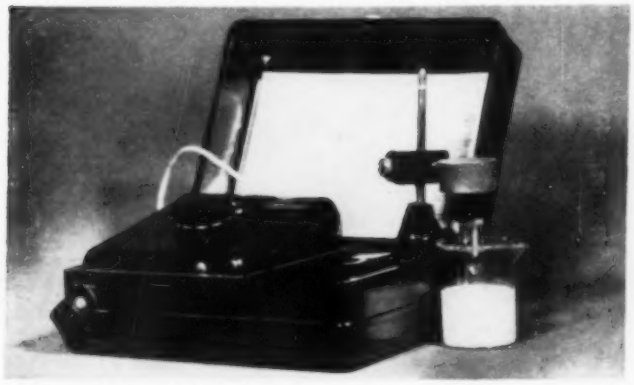
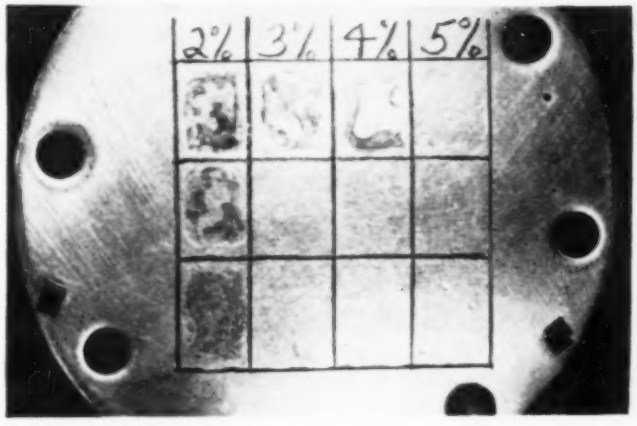
Tests for Soluble Oils—II



Babcock flasks . . .
used for determining oil content of emulsifiers. *Left*—emulsion before acid added; *right*—clear fluid after addition of acid, showing how acid has "split" oil out of water



Coleman Model 20 pH Electrometer



Cast-iron plate test . . .
Vertical lines represent three different emulsions under three different conditions. Horizontal lines represent emulsion strength

common usage are slightly alkaline but may be neutral or slightly acidic. In the pH scale, 7.2 is neutral. An average alkaline emulsion has a pH of 8.5 to 9.5 and an average acidic emulsion has a pH of 5.0 to 6.5. This test is not a test of emulsion quality. It is a control test to maintain the desired pH in an emulsion of a specific oil.

There are several methods of determining pH. The most common is the use of pH papers (specialized litmus papers) available in a wide range of pH Values. These papers are dipped in the emulsion; the paper takes on a different color for each pH value in the emulsion. A similar method uses liquid indicators. A few drops of such an indicator in an emulsion sample will cause a color to develop in the emulsion, which will indicate its pH. In both cases, the color is compared with a standard color chart.

By far the most accurate method is to use an electric pH meter, such as the Beckman or Coleman.

In any sort of pH control, the pH of a fresh emulsion made under shop conditions is determined. Then a daily check on the pH of the shop emulsion is run. Any change from the original pH usually indicates contamination, and an adjustment may be necessary.

In practice, shop emulsions normally are in the 8 to 9.5 pH range. If tests show a decrease, the emulsions are adjusted to bring them back into the above range by addition of mild alkalies such as soda ash, trisodium phosphate or borax.

ALKALINITY OR ACIDITY BY TITRATION

The pH of an emulsion indicates the degree of alkalinity or acidity of an emulsion, but it does not measure the total alkalinity or acidity. Because most shop emulsions are alkaline, some laboratories prefer to titrate the alkalinity of emulsions with 0.1 normal hydrochloric acid and express the results as percent of sodium hydroxide. This method is best for large central systems. Details of this method are described in Note 4. See Appendix.

EXTREME-PRESSURE TESTS

The chief value of an extreme-pressure test on an emulsion is to establish the fact that it is or is not a heavy-duty emulsion. Such tests are usually run on the Falex or Almen EP testing machines. In general, the EP characteristics, or the film strength, of

Tool Steel Topics

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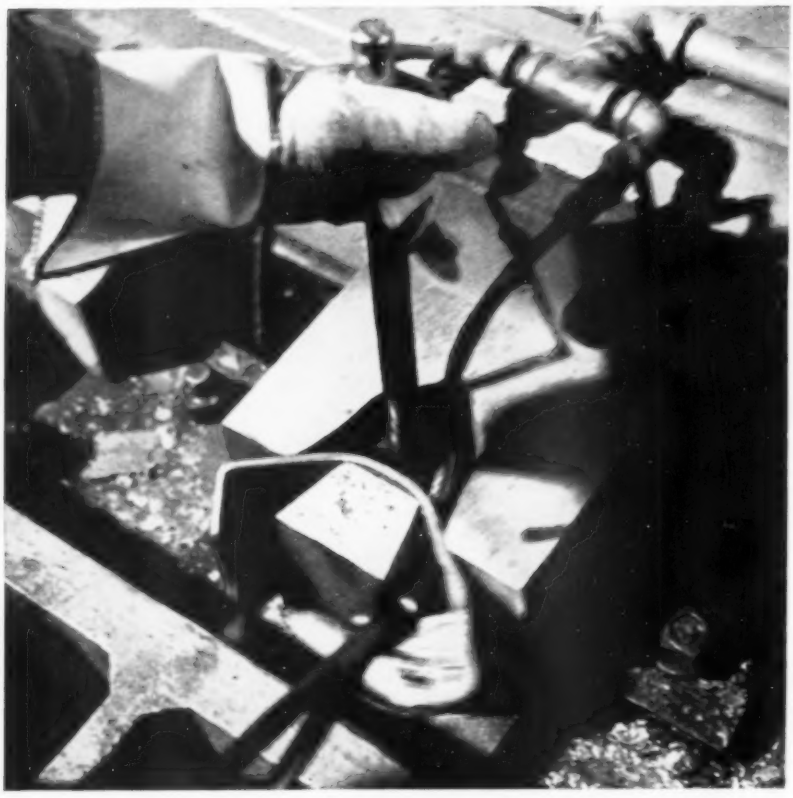

Highway Guard Rail Brackets Formed Red-Hot with Cromo-W

The product is a steel offset bracket, ¼ in. thick. It's used for fastening wire rope to highway guard rail posts. The bracket is formed red-hot, with a two-stage die of Bethlehem Cromo-W tool steel. Between 90,000 and 100,000 pieces are produced before redressing becomes necessary.

Cromo-W has a 5 pct chromium content and is one of our most popular general-purpose tool steels for a variety of hot-work applications. It offers good red-hardness and high shock-resistance. It also has good resistance to heat checking when cooled drastically during high-temperature operations, and is easy to machine and heat-treat.

Cromo-W is an ideal grade of tool steel for such diversified uses as die casting dies, bolt-gripper and bolt-header dies, trimmer dies, punches, and hot shear blades. In fact, it's a grade you can count on for long service in virtually any manufacturing operation involving severe shock and temperature change.

Typical Analysis

Carbon 0.35	Tungsten 1.55
Silicon 1.05	Molybdenum 1.65
Chromium 5.15	

In addition to Cromo-W, Bethlehem offers Cromo-WV and Cromo-High V for die casting and extrusion work. See your Bethlehem tool steel distributor for full details on these fine hot-work grades.

General view of the forming operation. Cromo-W is ideal for this hot-work application because of its good red-hardness and high shock-resistance.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Machining is a Tearing Operation

Close examination of the surface of a machined part, or chips machined from it, indicates the presence of countless minute tears. Generally, the tears can be seen most readily on parts machined at low speeds, with heavy feed and depth of cut. However, they are also present in all machined surfaces, even though not readily visible. The depth of surface tears on smooth machined tools and dies may be approximately one thousandth of an inch, or less. For this reason, the presence of the tears and their possible effects are often overlooked.

Most tools are heat treated after machining. Then they are ground all over to produce the exact dimensions, and to remove scale or decarburization resulting from the hardening operation. This procedure automatically removes tears in the surface previously produced during machining. However, many tools are ground only on certain portions, with the balance of the tool surfaces containing the remains of the machining tears, plus heat treatment scale and decarburization. This condition occurs often when you grind only the actual working surfaces which make contact with the parts. Tools produced by this method are more susceptible to failure in service because of stress concentration produced by the sharp change of section in the tears. This is particularly true of tools subjected to a large number of stress cycles in service, such as pneumatic tools.

Grinding all previously machined surfaces of tools after hardening is an operation which helps improve production from the tools. Grinding before hardening will also be effective, should grinding after hardening be inconvenient.

Tests for Soluble Oils—III

Bomb for determining . . . sulfurs and chlorines. Oxygen in bomb is ignited electrically, which burns chlorine, after which mixture is washed out and titrated

Kinematic viscosimeter

a heavy-duty emulsion are at least twice that of a conventional or regular-duty emulsion.

CORROSION TESTS

The most common corrosion test used on emulsions is the cast-iron chip test. Freshly machined, cast-iron chips are used because they rust easily and quickly. The Delco Division, General Motors Corp, developed the so-called Delco Cast Iron Chip Test at least 20 yr ago. That test, or modifications of it, are now in general use.

In this test a weighed sample of cast-iron chips (usually 10 gr) is put into a beaker of emulsion (usually 250 ml) and allowed to stand about 15 min with occasional stirring. The emulsion is then poured off and the chips placed on an inverted watch glass. Excess emulsion drains off the chips, which are then allowed to stand for 24 hr at room temperature. Note degree of rusting, if any.

In another test, a polished cast-iron plate about 8 in. in dia is ruled into squares or segments with a crayon. Drops of emulsion are placed on the plate and allowed to stand for 24 hr. The degree of stain, if any, is noted.

Both these tests are comparative tests, in that they compare the rust-preventive characteristic of two or more emulsions using the same lot of chips, the same water, same emulsion concentration, etc. The tests are useful for checking the rust-preventing properties of different shipments of the same soluble oil, but must be correlated with shop experience.

Occasionally, steel plate is used to test the rust-preventive properties of emulsions. Clean panels are dipped into emulsion samples and are hung up in the laboratory or shop for a definite time, sometimes 30 days, or until they rust. Sometimes such test panels are put into humidity cabinets or even salt spray cabinets to accelerate the test. Here, again, such tests are comparative and are usually run against an emulsion of a known oil.

APPENDIX

NOTE 1—To determine the alkalinity of a soluble oil, mix a 10 gr sample of oil with 10 ml of neutralized 3A alcohol in a 250 ml Erlenmeyer flask, and heat to boiling. Titrate with 0.1 normal HCl, using phenolphthalein as the indicator, until the red color just disappears. Calculate the alkalinity as % sodium hydroxide as follows: ml of 0.1 normal HCl × 0.04 = % NaOH

NOTE 2—To determine the acidity of a soluble oil, mix a 10 gr sample with 100 ml of neutralized 3A alcohol in a 250 ml Erlenmeyer flask, and heat to boiling. Titrate with 0.1 normal KOH, using phenolphthalein as the indicator, until the red colors appears. Acidity is expressed as mg KOH per gram of oil.

NOTE 3—Oil stability is tested by storing samples in refrigerators for at least one month at approximately 35 F. Samples are inspected for development of haze, gelation, and separation of any kind. Ease of emulsification and stability are checked after oils return to room temperature.

NOTE 4—The alkalinity or acidity of an emulsion is determined in the same manner as described in Note 1 and Note 2, except that 10 ml of emulsion is used as the sample.

NOTE 5—Steel Panel Test: Prepare 2 x 3 in. steel panels from bright-finished cold-rolled sheet steel. Thoroughly clean the panels by washing with petroleum naphtha and allow to dry. Then dip into the emulsion to be tested and hang up for exposure tests.

NOTE 6—A cast-iron plate about 8 in. dia. or square and about 1 in. thick is used for this test. The surface of the plate should be prepared by surface grinding.

Before each test the plate should be scrubbed with a rag saturated with petroleum naphtha and then wiped dry. It should then be polished with steel wool and fine emery paper. Finally, it should again be washed with petroleum naphtha and wiped dry. Using a pipette, put 5 drops of emulsion into each of the prepared spaces on the plate. Allow the plate to stand 24 hr and note the amount of stain, if any, that develops.

ANNOUNCING!

VICKERS New ¼" Temperature and Pressure Compensated FLOW CONTROL VALVE

ANOTHER VICKERS FIRST

FOR OPERATING PRESSURES UP TO 2000 psi

For years the Machine Tool Industry has been asking for a combination Temperature and Pressure Compensated Flow Control Valve to insure CONSTANT FEED RATES. Now for the first time it is available as a production unit at a reasonable price.

Check THESE EXCLUSIVE FEATURES that mean Optimum Tool Life and Better Work Finish:

☑ **TEMPERATURE COMPENSATED**
Constant feed rates all day long with same throttle setting because throttle automatically compensates for changes in oil temperature. The compensator mechanism is simple in design and durable.

☑ **PRESSURE COMPENSATED**
Constant feed rate throughout entire cycle because built-in pressure hydrostat automatically compensates for load changes.

☑ **SINGLE THROTTLE COMPLETE RANGE ADJUSTMENT**
Greater flexibility because valve is adjustable within entire flow range of 5 to 1000 cubic inches per minute.

☑ **REVERSE FREE FLOW AS STANDARD FEATURE**
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☑ **TAMPER-PROOF ADJUSTMENT**
Retension of original feed rate is assured because a set screw prevents inadvertent throttle movement and a cover over the set screw can be locked in place.

☑ **INTERCHANGEABLE**
This new valve replaces 12 previous models and it is interchangeable with all of them, also the drain connection is eliminated on the new valve to simplify piping.

☑ **GREATER ECONOMY**
No need to stock several valves for wide range of flow rates. Drain connection is eliminated, piping costs are reduced.

☑ **MAXIMUM RELIABILITY AND ACCURACY**
Design of temperature and pressure control components assures maximum circuit reliability and extreme accuracy of feed through a range of 5 to 1000 cubic inches per minute.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Talking Shop...

Selecting A Town

WHEN YOU OPEN a new plant employing 300 people, a total of 2710 people will be affected. To arrive at this total, Campbell Stuckeman calculates that the 300 new manufacturing jobs create 222 new service jobs in the community, and about 20 of the plant jobs will be filled by transfers of experienced supervisors who must be replaced in the jobs left behind. Each of the people affected averages a family of five, to arrive at the 2710 total. As vice president of Rockwell Manufacturing Co, Mr Stukeman has supervised the establishment of a half-dozen new Rockwell plants in recent years. The final decision in selecting a site is made by an unscientific walk around town to see if the grass is cut in the parks, what shape the schools are in, to see if churches and homes are well kept. "These casual observations can reveal as much as all the inducements and welcomes," he says.

Comparator Crowd

WE'VE JUST HEARD of a plant that has a J & L comparator beside every grinder. The company is so cost-conscious that it discovered it was cheaper to do this than have operators wait their turn at comparators shared with others. This is probably a special case because this company has been quite effective in applying incentives to their operation. It brings up a point we can all consider, however. How often do men wait their turn to get at a gage, a tool, or some other piece of equipment in your plant?

Where are they?

WILL WE, or our near descendants, ever visit other worlds in space? This question is said to have been asked of an MIT professor during a recent seminar. He replied by saying that we could only conjecture, but that following the laws of probability we might believe that the age of our solar system, with its planets, was somewhere in the middle of time, between the oldest and the newest galaxies. Thus, it is reasonable to believe that planets which will support life and intelligence have existed in other star systems for many millions of years longer than Earth; some, very likely quite similar to Earth. Even if their scientific development was slower than ours, they would be well ahead of us in scientific know-how. By projecting what we now know to be possible, space travel should be a routine capability for inhabitants of those other planets. Yet in all of the recorded history of Earth there has never been any proven visit by vehicles from space. Why? Is it because no one ever tried, because by the law of averages they missed us and visited elsewhere, or because some obstacle still unknown to us kept them from reaching us? As we ask where we are going, we must also wonder where they have been.

Engine Alloy

ALUMINUM AUTO ENGINES may be die-cast from an alloy containing 20% silicon. This composition was previously impractical because it was too hard to machine. Now, according to researchers at Alcoa, recently developed foundry techniques and improved cutting tools make this hard alloy practical. When heat treated the alloys have hardness up to 140 Brinnel. Low expansion and high wear-resistant qualities of the "hi-si" alloy make it a possibility for blocks and heads in an all-aluminum auto engine.

MEMOS

by BESS RITTER

When 15th Century French steel manufacturers sold their product they weighed it in a very unusual fashion, because the men who worked in the plants actually served as weights. The steel was placed on one side of the scale, and then the manufacturer pitted his weight against it. If the totals balanced, fine. If they didn't, other men were added in accordance with their rank: First came the principal assistant, then the lesser assistant, and so on down the line, until the lowest apprentice stepped on the scale.

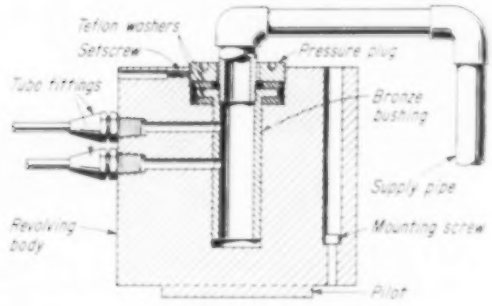
It's also odd to note that since there were three different grades of steel, each worker had three entirely different values, and instead of calling each other by nicknames, the men referred to their fellows by their lowest value in steel. This, incidentally, could be pretty low because poor steel was often sold at approximately eight cents the hundredweight.

There was a time when the people of Russia actually wore shoes which were equipped with soles made of steel. This was back in the 13th century, and wearers were the tribesmen who inhabited the lower portions of the Central Ural mountains. Such shoes were quite practical for mountain life since the soles, which were inch thick, were grooved to prevent slipping. True, being absolutely rigid, they had no "give," and hence were rather uncomfortable.

However, they were certainly economical, because not only did the tops wear out before the metal soles, but the latter actually lasted so long that one generation passed them on to the next, and a man might very easily wear soles which he inherited from his great-great grandfather. They were kept carefully greased to prevent rusting.

Practical Ideas...

Automatic Oil Distributor Revolves With Turret



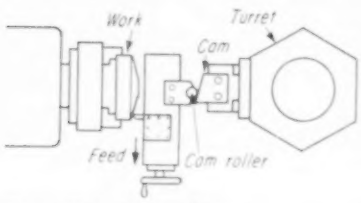
During a recent large production run our turret-lathe operators had to hand control the cutting-oil flow for each operation. The reason for this was that some operations would demand oil, others would not.

To eliminate this nuisance we constructed an oil distributor for each of the seven machines in our shop. They mount on top of the hexagonal turrets, and are centralized by pilots which fit the turret-center hole. As the turret is indexed, the distributor rotates with it, providing the various operations with cutting oil as required. The main body is approximately 4¾ in. in diameter and 5½ in. high. It is bored concentric with the pilot to receive a bronze bushing with clearance of 0.002 in. or less. The bore is also counterbored and threaded for a pressure-seal plug. Two 5/16-in. holes are then drilled above each other at six locations around the periphery of the body, 60° apart, and each pair at identical heights. These twelve holes must all meet with two ports in the stationary bushing when the turret is indexed. All holes are tapped for copper tube fittings.

One end of a piping arrangement is screwed into the bushing and the other attached to the turret slide to keep the bushing stationary and supply the distributor with cutting oil. Teflon washers are used above and below the shoulder of the bushing to form a seal with the least amount of friction. The pressure plug is screwed down just tight enough to complete the seal, but must allow the turret to rotate without binding. The plug is then locked with a setscrew.

Copper tubing is installed and bent to shape to direct the flow of oil. Stations not employing oil are plugged. A hose connects the pipe mounted on the slide with the sump pump.

Herbert F Stone, Durham, N C



Cam Setup Produces Engineered Facings

The sketch above shows a cam setup as it is used in one of the turret stations on a turret lathe. It describes the method we recently employed when we had to turn out machined parts, some of which included broad bevel faces, and other with irregularly contoured faces. The straight-bevel setup is illustrated.

The cam, which is hardened after it has been machined to the contour or angle desired, is mounted on an angle bracket located on the turret. A sealed-ball bearing, mounted horizontally on the carriage, serves as the cam roller.

Cutting is done from the center of the work toward the operator. The cross-slide feed is used under power, while the lateral control and feed are disengaged. Depth of each succeeding cut is adjusted by the turret-slide stops.

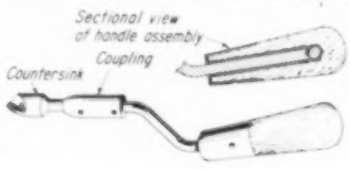
Harold B Rosenberg, Buffalo, N Y

High-Speed Hand Deburring Tool

When a burr has been formed on the underside of the work by a through hole, the accuracy of some or all of the subsequent holes may be affected. That's the reason why we made the hand-operated deburring tool shown in the photo to rapidly, and with a minimum of effort, eliminate burrs. If a burr must be removed because of the location of a parallel, it's necessary only to turn the piece upright, crank the tool once or twice in the hole, and the burr is gone.

The tool employs a standard countersink which should be at least 25% larger in diameter than the holes being deburred. It is fixed to a crank-shaped rod by a coupling and locked with a pair of setscrews.

Before the rod is bent, preparations must be made to allow the handle to rotate on the rod. This is done by first center drilling the end of the rod to engage a thrust ball. A thin-wall bronze or brass bushing is then machined; the ID of which fits the rod and the OD a pressed fit into a hole drilled into a file handle. The drilled end of the rod is lightly peened so that the handle will not come off once it has been assembled on the rod.



After the bushing is slipped onto the rod, up to the peened edge, two opposite bends are made on the rod to produce an offset. To mount the handle, a steel ball is first dropped into the hole. The bushing together with the crank, is then pressed in. Should it be possible to remove the ferrule without causing damage to either handle or ferrule, it can be made to retain the bushing. (See sectional view of handle.) Mounting the countersink on the other end of the crank completes the tool assembly.

Norman Fried, Los Angeles, Calif

Protection For Your Tools

During the summer months, when the humidity is generally higher than at any other time, precision tools are more likely to form rust. A few mothballs placed in the tool box, or drawers of the tool chest, will absorb moisture and prevent rusting.

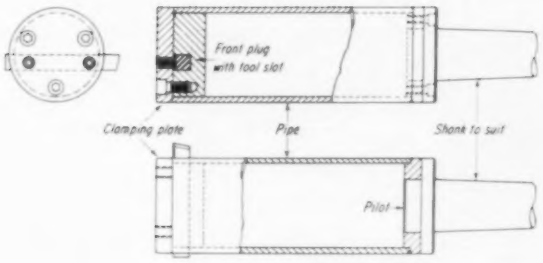
E Mayover, Bradenton, Florida

Rigid Lightweight Boring Bar

Large-diameter boring bars such as those used in heavy boring mills are usually cumbersome objects. In many cases they are so weighty and unwieldy that one man will have difficulty in lifting them.

To reduce weight without sacrifice to rigidity, we have constructed our oversized boring bars from standard iron pipe, as shown. While this type of bar is relatively light in weight in proportion to its size, it is just as rigid as if it were solid, and is less expensive as well.

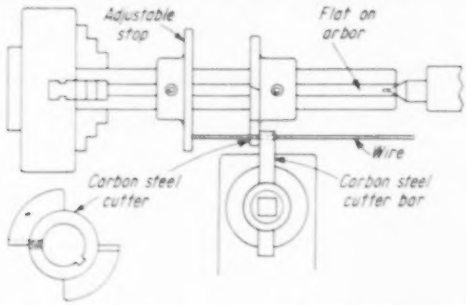
After a piece of pipe has been selected, both ends are squared off and bored clean to receive the end pieces. One of these is a plug pressed into the pipe and welded in place. When the weld has been faced flush a slot is milled across the end to accept the cutting tool. A cap plate is bolted to the plugged end with recessed capscrews. This carries two headless capscrews for clamping the cutting tool.



The opposite end is also fitted with a plate. This plate is lighter than the tool-holding plate, and is turned with a boss to fit inside the pipe. After it has been welded, it is faced and bored to receive a flanged shank. If normalizing is desired because of the welds, it should be done before final machining.

Roger Isetts, Kenosha, Wis

Lathe Powers Pin Cutter



Large quantities of wire pins are constantly required in our work. The problem has always been to get them cut to proper and uniform lengths with less efforts. Previous to our mechanization of this operation the wires were hand cut, a slow and tedious process.

The simple rig shown in the drawing makes this job easy. A high rate of production is possible because it will cut two pins with each revolution of the arbor. Longer pins will necessarily slow down the output because the wire is manually fed to the cutter.

The cutter is made from carbon tool steel to somewhat resemble a large pipe flange. Two opposite-quarter sections are milled away leaving two quadrant cutter blades. The leading edge of each blade is then milled or filed to a 30° cutting angle.

Another flange is turned, but from CR steel, to serve as adjustable stop. Both cutter and stop are secured to an arbor with setscrews. In addition to a flat on the arbor for the setscrews the cutter is keyed for more strength.

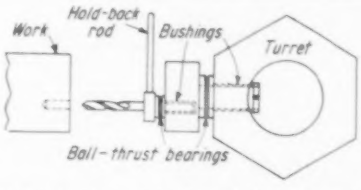
A cutter bar, also made from tool steel, is drilled to a diameter with slight clearances over the wire to be cut. After the cutter and the cutter bar have been heat treated, the device is ready for assembly. The cutter and stop are adjusted on the arbor. The arbor is then chucked in the lathe and supported by the tailstock center. When the cutter bar has clamped in the toolholder and positioned next to the cutter, wire cutting can begin.

Joseph Kupski, Tool Eng'r, Chicago Hardware Foundry Co, North Chicago, Ill

Novel Turret Tooling

A quantity of parts we were recently machining in a turret lathe, needed an eccentric locating hole in the end facing the turret. A drill plate and a holding fixture for the part, not to mention an additional handling, would have been necessary to get this hole drilled by standard procedures. Our aim was to avoid this extra work and the sketch shows the method we used to successfully drill the hole without as much as removing the piece from the lathe.

One of the stations in the turret was first cleaned up. (If the bore is not entirely round and concentric, a light boring cut should be taken.) The bore was then fitted with a bronze bushing to receive the body of an eccentric-drill unit. After the body had been machined to suit the bushing and a ball-thrust bearing, the bore for the drill-holding spindle was laid out and machined.



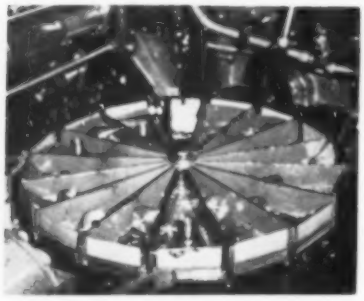
This bore also received a bronze bushing in which the drill spindle rotated backed up with a ball-thrust bearing. A husky rod designed to prevent the drill from rotating was threaded into the collar of the drill spindle. The drill we used was fairly short and secured in the spindle with a setscrew seated on a flat ground on its straight shank. Obviously, small diameter, or very long drills should not be used in this unit because of their flexibility.

When a hole has to be drilled the turret is indexed to position the drill unit forward. The rod is then allowed to rest on the lathe bed or other unobstructed straight-line rest as the drill is fed into the work.

H Koslow, Bronx, NY

Practical Ideas...

Merry-Go-Round Protects Parts

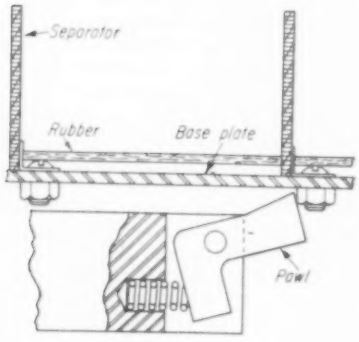


By standard methods, parts produced in automatics are delivered by chute to a receptacle. This kind of handling will inevitably cause dents and nicks on the parts as they meet.

Such imperfections, however slight, would constitute a major defect on the precision shaft adapters we manufacture. Several edges, created by various diameters on the OD, have to be kept sharp and free from nicks. To have the operator attend the machine full time, to remove each part as it comes down the chute would add prohibitive operational cost.

The solution was simple and inexpensive. We constructed a merry-go-round to receive each part in a separate compartment. As a part is machined, the merry-go-round indexes to station an empty compartment under the chute. This allows the operator ample time to attend and check one or two other machines between each manual unloading.

The base of the receptacle is a 21-in. disk cut from ⅛-in. sheet steel. Fibre separators, held in place with small angle brackets, divide the disk into 16 equal sections. The outside ends of the sectors are closed in with light gage steel plates, and the bottoms are lined with rubber matting.

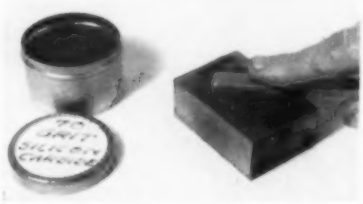


A central hole and three equally spaced holes around the center were drilled to receive a single-revolution precision spring clutch. This clutch and a block to which it is bolted constitute the bed mounting for the merry-go-round. The clutch permits rotation in one direction only, and the clutch coupling with its three prongs to engage the three holes in the disk serves to support the disk, also making its removal easy.

An arm attached to the lower cross-slide, carries a pawl which indexes the disk from the underside. The bolts holding the separator are placed in a uniform circle about the center to enable us to use the nuts on the underside for indexing stops. The pawl advances as the cutoff is made, and skips over the adjacent separator bolt as it is retracted.

To prevent overindexing a leaf spring is mounted on a suitable position on the machine to restrict motion. A funnel formed from sheet brass is attached to the end of the chute to insure exact parts depositing.

Oliver Horvath, Cleveland, Ohio



Lap Restores Hone Flatness

The small hand hone, frequently used to touch up the edges of carbide tools, will eventually become grooved and loaded. When this happens, the flatness and bite can quickly and easily be restored by the illustrated method.

A small flat steel block is used as a lapping plate. Silicon-carbide abrasive grain of medium-course grit size (from 60 to 80 mesh) is then sprinkled over the surface of the block. By rubbing the hone in a circular motion on this surface, the hone is cleared and straightened.

Care must be taken to hold the hone firmly against the lapping surface to avoid crowning. No oil or other lubricant is necessary or desirable.

H J Gerber, Stillwater, Oklahoma

JOSEPH BONNAFE
Wilmington, Mass

won $25 in addition to regular payment for his idea:

CARRIAGE ADVANCED WITH DIVIDING HEAD ACCURACY

in the March 24, 1958 issue

An extra $25 will be paid for the best Practical Idea in each issue of *American Machinist*. Selection of the winner is made by a group of our readers.

Our annual Production Planbook will reprint all winning ideas as a review. One will be chosen out of this issue as a winner of winners, and will receive a

GRAND PRIZE OF $100.

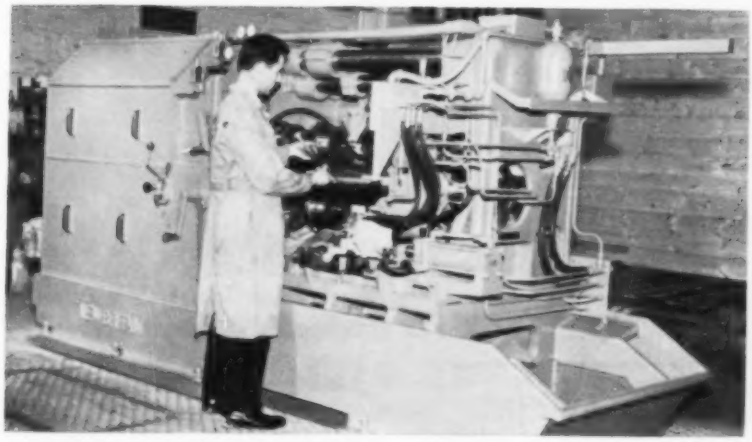
JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer, or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send all entries to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N. Y.

New Shop Equipment
Materials and Parts



Multiple-Spindle Copying Lathe Turns Transmission Shafts in 32 Seconds

Transmission shafts will soon be contour turned in one-third the time of present setups. In one case, two New Britain multiple-spindle copying lathes will replace six modern single-spindle machines. Production from each new lathe will be 110 shafts per hr. Unloading and reloading will be done during the machine cycle. A loading mechanism can be applied if desired.

Accuracy is not sacrificed by dividing the cuts among three stations on the multiple-spindle machine. Bearing diameters will be held to ± 0.0015 in., and these diameters will be concentric within 0.002 in. These limits are well within part tolerances.

Metal removal achieved by the 40-hp machine is 4 lb, 4 oz in only 32 sec, using only four indexable carbide toolbits.

The Model 412/25 copying lathe represents a combination of proved machine-tool principles and construction. Head-end drive is taken directly from the New Britain Model 412 open-end chucking machine; the spindle carrier likewise. Hydraulic copying slides were developed from experience with the company's +GF+ single-spindle copying lathe.

Hydraulic copying slides can be mounted at the three work stations. Forming arms and/or cross-slides can be mounted at the same work stations. An infeed or necking slide can also be mounted at the No. 1, or loading, station.

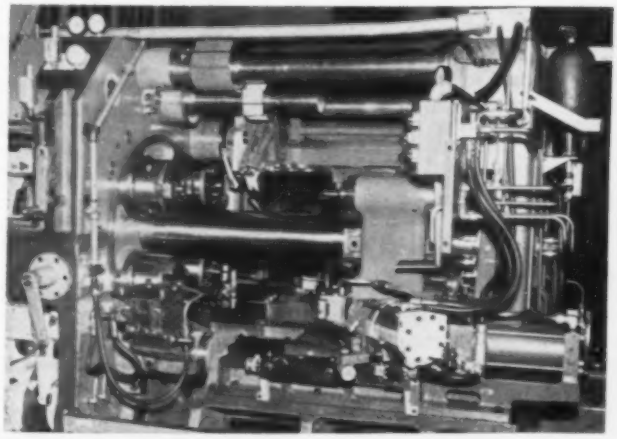
On multiple-spindle copying lathes now being built for another transmission manufacturer, a top plate has been added to take an automatic loader. Provision has also been made for a grooving slide above the No. 4 position.

As in all New Britain chuckers, the spindle carrier indexes counterclockwise (in same direction as spindle rotation) for minimum shock. Because the work is chucked between centers, the driving spindles and the tailstock centers index together through the work positions. For the part illustrated, the cycle in relation to carrier positions is:

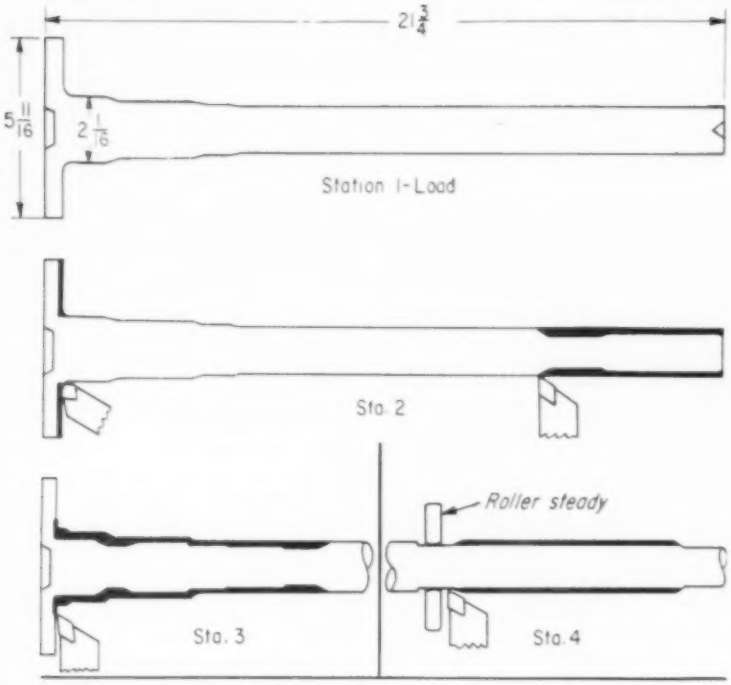
Position No. 1—unload and reload while machine is working. A V-type "approximate" work locator receives the 2-in. dia of the shaft, so that the tailstock center can pick up the center hole. A safety feature prevents indexing if the hydraulically operated tailstock center does not engage the work for any reason. Flange end of shaft is centered and gripped by hydraulically actuated chuck. Centers at this station and the others are adjustable longitudinally to position the part longitudinally.

Postion No. 2 (lower front)—The cross-slide advances to face the flange. To provide suitable cutting conditions for good tool life, the spindle runs at half speed (492 rpm) until the tool has advanced halfway. At this point the spindle speed is shifted into high (985 rpm) automatically.

When the cross-slide traversed to



HYDRAULIC COPYING SLIDES have double interlocks to prevent malfunctions. Turning length is 8 in. on the No. 2 slide and 11½ in. on the No. 3 slide of machine shown; length can be suited to job



One cycle . . .
through the copying lathe completes all turning operations on a shaft for an automatic transmission. Bearing surfaces are held concentric within 0.002 in. TIR

the cut, the copying slide also moved in but waited. Now, with the high speed engaged, the conditions are such that the cross-slide can finish the flange surface at an effective cutting speed and the copying slide can turn the shaft at the spline end.

Position No. 3 (lower rear)—Contour turn the bearing fits and speedometer-gear section. This cut is the longest one and is done at 0.023 ipr. Size control is well within requirements for a green grind.

Position 4 (upper rear)—Turn a central section, using a roller steadyrest on a hydraulically actuated arm. Use of the steadyrest prevents any clatter or vibration.

A separate Vickers hydraulic system, with a pump for each slide, is placed at the rear of the machine.

Many safety features prevent malfunctioning of the machine. These features are:

1. A safety switch prevents spindle rotation if the tailstock does not engage the work.

2. The steadyrest must retract before the carrier can index.

3. Controls are duplicated at the front and rear of the machine, so that full control of tool setting and slide adjustment is always available.

4. At the last station, a switch checks whether the piece has been turned. If not because of a broken tool, the machine shuts down.

5. At each station, the slide must finish its cycle before the carrier will index. Furthermore, each slide must be at the correct starting position, before the cycle can start. These two protective measures are accomplished by double interlocks, consisting of limit switches, wired in series, at beginning and end of the templets. Thus, the slides and tools cannot be smashed and they cannot get out of timing.

Several adjustments supplied

1. The chuck-clamping pressure and the tailstock-center pressure can be varied independently of each other to aid concentricity. This effect is particularly valuable at the third and fourth positions.

2. The centers can be adjusted in or out to position the workpiece.

3. The templets, which normally provide for an 8 in. cut, are adjustable longitudinally. The tracers can be adjusted to the diameter being cut.

4. Pick-off gears for the cross-slide feed are exchangeable. Pick-off gears are likewise used for different spindle speed combinations.

5. All slides other than the cross-arm are hydraulically fed at infinitely variable feed rate.

New Britain Machine Co, New Britain, Conn

Rocker-Arm Spot Welder Offers Choice of Throat Depths

Model SR O rocker-arm spot welder features an unusually rigid frame, and transistorized controls with plug-in components. Lowcost unit is available in standard "O" size frame, with 30 or 50-kva transformer. Throat depth can be varied by a choice of six arm lengths, ranging from 12 to 42 in.

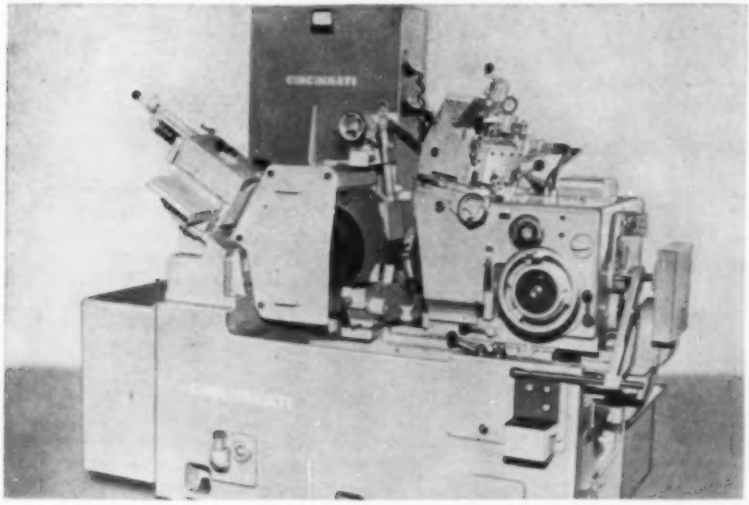
Sciaky Bros, Inc, 4915 W 67 St, Chicago, Ill

Reamer Sets Finish Holes From ⅝ to 2 in. Diameter

Two new production reamer sets providing special diameters without regrinding are available in compact mahogany boxes.

Kit 1122 contains three bars and seven cutting heads which can ream any hole from ⅝ to 1 in. in dia. Kit 1123 has three bars and 14 heads for reaming holes from 1 to 2 in. in dia. Tool features include micro-adjustability; balanced, floating cutting action; cutter expandability for extensive resharpening allowance. They are made of HSS.

Madison Industries, Inc, Muskegon, Mich



Centerless Grinders Offer Reduced Setup Time, Wider Work Range

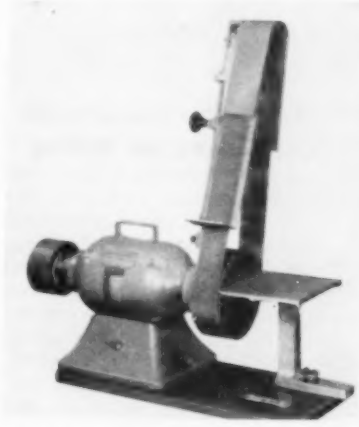
Two Cincinnati centerless grinders, the 15-hp No. 2 and the 25-hp No. 3, have been improved to offer reduced setup time and to broaden the range of application. Grinding wheel truing controls are now located at the left-hand end of the bed for improved convenience of operation. The bed is 5 in. longer, to provide a greater area of support for the truing units.

Greater throat capacity accommodates larger regulating wheels (13 in. dia compared to 12 in.). For manual infeed with automatic hydraulic ejector, the infeed lever can be moved through a partial arc, while still retaining the advantage of automatic ejection of the work. The work-rest pad is machined with a parallel slot to facilitate alignment of the work-rest blade with a dial indicator.

New grinding fluid control eliminates splashing and more effectively floods the work. A greater selection of accessory equipment is now available. One of the most interesting accessories is the vari-pitch unit for hand infeed grinding equipment. Through a simple change gear arrangement, the operator has a choice of three throat openings between the wheels for loading and unloading the work.

A precision indicator attachment for rapid, visual taper correction is also available. It incorporates a taper correction calculator and two dials, one for direction of swivel and the other for amount of correction, measured in increments of 0.000,010 in. per in. of length. Automatic grinding wheel balancing can be obtained as a built-in feature. Another accessory is the attachment for endwise adjustment of the grinding wheel spindle up to 3/16 in. forward or back. This unit is equipped with a large indicator dial and handwheel which can be reached from the operating position. Catalog G-644-4.

Cincinnati Grinders Inc, Cincinnati 9, Ohio

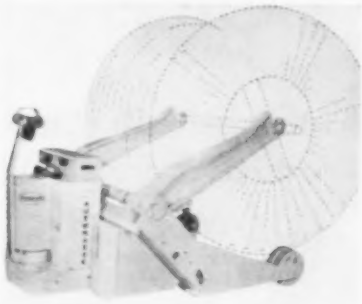


Machine Performs All-Purpose Grinding, Finishing, Deburring

The Versa-Mite bench-mounted machine has a fast-cutting abrasive belt and a serrated contact wheel. A coated abrasive disk, fastened to the side of the contact wheel, and a tilting adjustment on the table permit square and angle grinding as well as chamfering and surfacing.

Abrasive belt extension arms can be mounted on both ends of the motor for roughing and finishing with one handling of the material. Machine can be operated with the arm in either the vertical or horizontal position. Grinding wheels, wire brushes or buffing wheels can be mounted on either end of the motor. Wheel guard and tool rest are furnished as optional equipment. Price is $192.50.

Carborundum Co, Curtis Machine Div, Jamestown, NY



Electric Cable Reel Handler Has Pivoted Lifting Arms

Model WC, with lifting capacities from 8000 to 15,000 lbs, incorporates pivoted lifting arms that are adjustable. Previous models had a vertical lift which was limited in handling various reel widths.

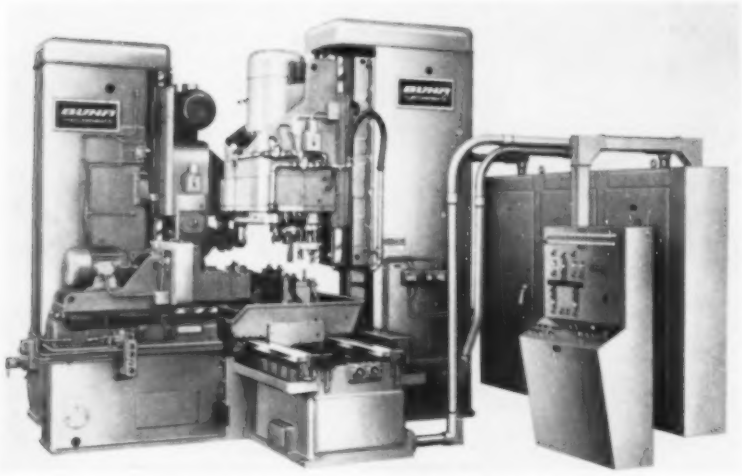
Truck does not depend on a flow divider to synchronize the lift of the load arms; simultaneous movement is assured by connecting telescoping torque tube. Eight-inch load arms are available to handle reels 36 to 46 in. in width and 30 up to 90 in. in dia. Max lift raises the 90-in. reel 3 in. off floor surface.

Automatic Transportation Co, Div of Yale & Towne Mfg Co, 149 W 87th St, Chicago 20, Ill

High-Temperature Alloy Withstands Temperature of 1200 F

High-temperature alloy, Lapelloy C, is used for highly stressed jet-engine parts involving service temperatures up to 1200 F. It has greater ductility and impact strength at both room and elevated temperatures than conventional Lapelloy when heat treated to same strength level. Material offers best corrosion resistance when in the hardened and tempered condition. It is used for compressor wheels, turbine shafts, compressor buckets, and blades.

Carpenter Steel Co, Reading, Penna



Automatically Controlled Machines Produce Several Different Parts

Automatically controlled machines combine the advantages of multiple operations in automatic in-line sequence with the ability to switch rapidly from producing one part to another of entirely different dimensions and shape. The machine illustrated is programmed to produce any one of six different parts for road building equipment. The sequence cycles of from six to eight operations are selected by turning a selector switch to the position corresponding to the part.

Complete turnover from one part to another requires only changing of tools and workholding fixtures, and resetting positive feed stops on heads if necessary. The pallet carries the workpiece to the farthest work station required by the part and then indexes toward the operator, stopping only in stations where work is to be done on part, until it reaches the unload position.

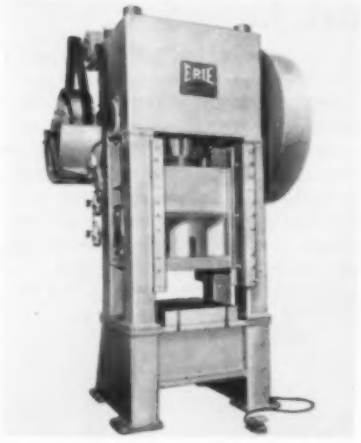
Further increasing the flexibility of the machine application is its use of building-block components.

Buhr Machine Tool Co, Ann Arbor, Mich

Totally Enclosed DC Motors Operate in Contaminated Atmospheres

Available in constant or adjustable speeds in frame sizes of EB-120 and up in ratings from 10 through 200 hp, these motors are designed for machine tool drives, steel mill drives as well as other heavy applications in locations having airborne foreign matter. Motors feature self-contained heat exchanger cooling.

Allis-Chalmers Mfg Co, Milwaukee 1, Wis



Trimming Presses Also Serve for Blanking, Forming and Drawing

New line of single point, straight side presses is designed primarily for trimming forgings, but is also useful for blanking, forming and drawing. The press frame is of 4-piece construction, and uses pre-stressed strain rods for rigidity. The presses feature central forced lubrication, air counterbalance, power ram adjustment, and an air-operated friction-type clutch. Various speeds and strokes can be supplied; capacities range from 150 to 600 tons.

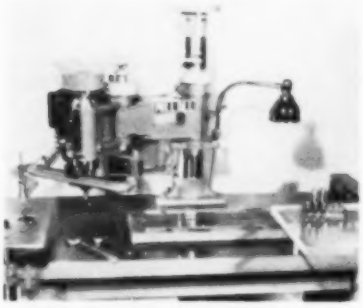
Erie Foundry Co, Erie, Penna

Pre-Engineered Numerical Control Package Unit Available from GE

Designated the Mark II, this compact two-motion control unit can be applied to any machine requiring point-to-point positioning of linear or rotary motions. Among those expected to benefit from this new development are manufacturers of small-lot production jobs, at extremely close tolerances. Unit is reported to be generally less expensive (under $10,000 net for resale) than comparable specially-designed units and is available for "off-the-shelf" delivery.

Unit offers positioning speeds up to 60 ipm. Control provides for individual or simultaneous linear or rotary positioning and has an electrical accuracy of ± 0.0005 in. at travel lengths up to 99.99 in. For lengths of travel up to 399.99 in., electrical accuracies of ± 0.005 in. can be obtained. System operates from numerical data stored in standard 8-channel, 1-in.-wide punched tape and/or manually-set decade switches, and is capable of both semi-automatic and fully-automatic operation.

General Electric Co, Schenectady 5, NY

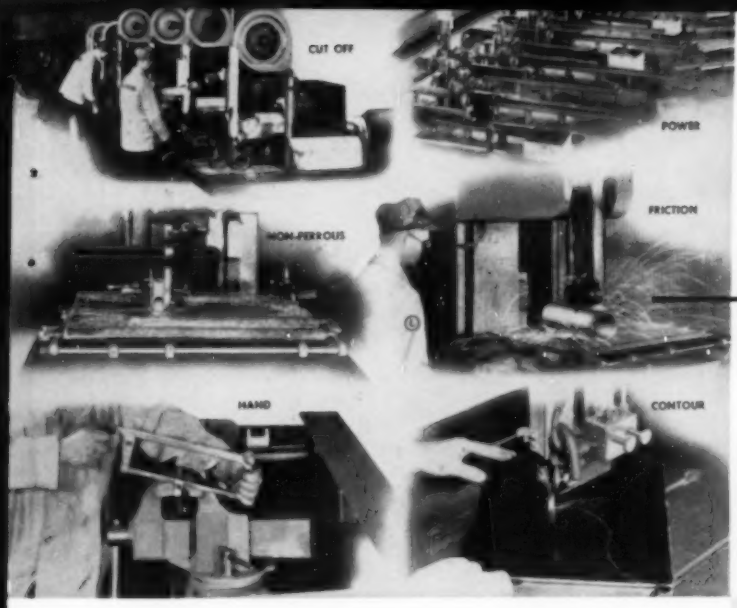


Toolroom Milling Machine Is Pantograph-Controlled

Mill All is designed to fill the gap between two-dimensional engraving machines and duplicating machines. It can be used for milling, machining, routing, drilling, spotfacing, grinding, slotting, lapping, indexed milling and engraving on all metals and plastics. It is said to be adaptable for work on instrument parts, castings, molds, dies, and close tolerance machined parts.

Unit consists of a 2 x 28 x 60-in. base table; 1/3-hp ac motor (60c, 110 or 220v allowing 500 to 6000 rpm in six stages); closed spindle and quill unit; dash pot; sub-table; and a ratio setting slide (max ratio 8:1 down, inverse ratio 1:3); light, and coolant pump. Machine has a 22-in. reach from the column, 18-in. swing, and a 9½-in. clearance under cutter. Tolerances of ± 0.0005 are said to be readily held with properly made master.

Mill All, 8 E Prospect Ave, Mount Vernon, NY



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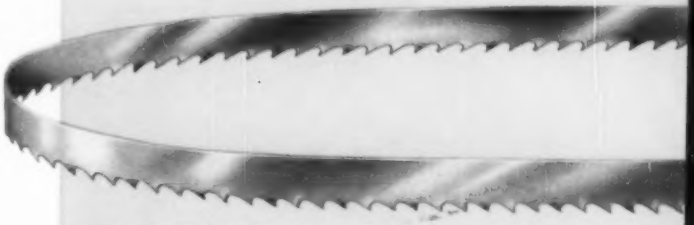
BAND Raker and wavy sets; skip-tooth, positive rake and friction cutting designs. Sizes ⅛" through 1". Welded to specified length or in 100', 250' and 500' coils.



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PACKAGING—Power blades—10 per carton. Hand blades—100 per carton. Band saws—coil stock in window-type cartons and wood boxes; or welded bands in individual boxes and 10 boxes to a carton.

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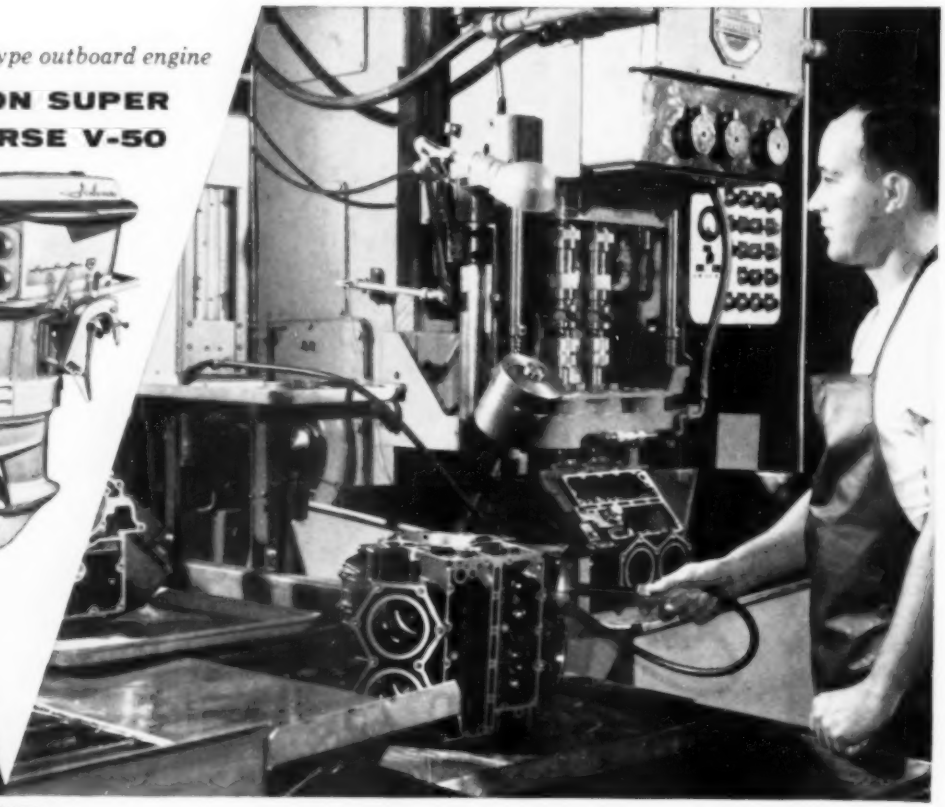

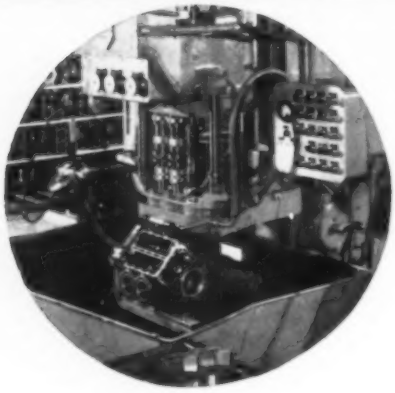

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1.7 minutes cycle time per block, honing 4-cylinders—each with 8 ports — ±.00025" bore-to-bore size, ±.0001" roundness and taper, 38-45 RMS finish.

This BarnesdriL Honing Machine, located in the Waukegan plant of Johnson Motors, is arranged for conveyor-line production and automatically sizes and finishes cylinder bores of two different V-engine aluminum blocks with integral cast-iron sleeves. Operator has convenient pushbutton control of the machine and trunnion-type fixturing for production line efficiency. The machine accomodates the two different blocks through 3-spindle head and hydraulic lateral index to locate proper offset between the cylinder banks.

Cycle time of 1.7 minutes includes Plugmatic bore-to-bore sizing and dwell for positive depth blind-end honing. Size, straightness and roundness over 8 ports in each bore are consistently controlled by BarnesdriL electronic hone expansion, plugmatic bore-to-bore sizing, and automatic compensation for stone wear.

If you have high-quality-bore production problems, consult BarnesdriL engineers for production line and quality control. Estimates furnished with no obligation. Send part samples or drawings.

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MACHINES AND ATTACHMENTS

1 SIMPLIMATIC AUTOMATIC LATHE—*Giddoit Machine Co, 1845 E Washington Ave, Madison 10, Wis.* 22-page catalog, Form 1159-C illustrates and describes in detail the construction features of Masterline Simplimatic and available accessories. Basic machine information provided; 39 different job applications pictured and discussed.

2 CENTERLESS GRINDING MACHINE—*Cincinnati Grinders Inc, Cincinnati 9, Ohio.* 22-page illustrated catalog G-644-4 contains detailed information on Filmatic No. 2, including design highlights, construction features, general specifications, dimensional drawings, standard and optional equipment.

3 CONTOUR MILLING MACHINES —*Onsrud Machine Works, Inc, 7720 N Lehigh Ave, Niles, Ill.* 8-page illustrated catalog 1167 describes new line of gantry-type AHT and AH series of syncro-hydro-feed units for production milling of honeycomb structural cores, integral stiffened wing, wing skins, panel plates, bulkheads, doors, and related nonferrous aircraft components. Specifications included.

4 NUMERICAL DRILLING CONTROL—*Electronic Control Systems Div, Stromberg-Carlson Co, 2251 S Barrington Ave, Los Angeles 64, Calif.* Illustrated brochure describes the Digimatic Control System for table positioning. System, which adapts to existing drillpresses, consists of tape preparation unit, control unit, and compound servo table. Automatic drilling of a typical part is illustrated step by step, and a cost comparison with hand drilling is made.

5 POWER PRESSES—*Johnson Machine & Press Corp, 620 W Indiana Ave, Elkhart, Ind.* 6-page illustrated bulletin 1958 gives specifications on line including inclinable presses in both fly wheel and back geared type in capacities from 16 to 150 tons; single and double crank straight side presses as well as gap up to 250 tons, plus the new 60-ton horn press are covered.

6 PRODUCTION CONTROL SYSTEM —*Control Systems Co, Division of Hancock Industries, Inc, Jackson, Mich.* 8-page brochure pictures and describes system, the Hancock Telecontrol, whereby each production machine in a plant is linked electrically to a central monitoring room where visual displays and recorded data give minute by minute information on machine operation and progress of work in process.

7 MACHINE TOOLS—*Morey Machinery Co, 585 Lafayette St, New York 3, NY.* 32-page illustrated catalog provides brief descriptions and condensed specifications for lines of lathes, millers, engravers radial drills, gear hobbers, plus attachments and accessories.

8 CUTTING MACHINE—*Foster & Allen, Inc, Chatham, NJ.* 4-page brochure gives details on the Model IV Versa Cutter for handling extruded plastics, rubber, and other composition. Standard models cut materials up to 2 in. in dia in a wide variety of shapes and structural characteristics; can make more than 7000 cuts per minute, as thin as 1/100th in.

9 CONTOURING MACHINE — *Olofson Corp, 2725 Lyons Ave, Lansing, Mich.* 4-page bulletin presents illustrated information on standard cam-operated precision Model 30-008 designed for combinations of boring, turning, facing, including tapers, contours, grooves, undercuts, and chamfers.

10 PLASTICS INJECTION MOLDING MACHINE — *Hydraulic Press Mfg Co, Division of Koehring Co, Mount Gilead, Ohio.* 6-page bulletin 58F80 describes new 80-oz capacity preplasticizing Model 450-P-80 that makes possible the production of minimum weight parts with absolute control over shot weight. Design features illustrated; specifications, standard and optional equipment covered.

11 TWO - DIMENSIONAL TRACER CONTROL — *General Electric Co, Schenectady 5, NY.* 8-page bulletin GET-2736A provides functional description of

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control, including technical notes on operation, design, and experience of tracing performance. Pictures, line drawings, circuit diagrams, and performance table illustrate the bulletin.

12 "DUREZ GUIDE TO SHELL MOLDING"—*Durez Plastics Division, Hooker Electrochemical Co, North Tonawanda, NY.* 33-page illustrated, revised edition discusses merits of shell molding, methods, materials, equipment, and costs. Describes causes of various defects encountered in molding, offers remedies for prevention.

13 HEAVY-DUTY ROLL GRINDERS—*Farrel-Birmingham Co, Ansonia, Conn.* 28-page bulletin 120 illustrates and describes features of machines, including a number of recent design innovations. Contains tables of general specifications and dimensions and weights for all six sizes available.

14 AUTOMATED SPECIAL MACHINE TOOLS—*Snyder Tool & Engineering Co, 2400 E Lafayette Ave, Detroit 7, Mich.* 20-page illustrated catalog divides special metalworking machine tools into specific generic types, outlines production parts, operations, and rate schedules to which they are applicable. Line-index, trunnion, rotary index, boring and turning machines covered, as well as transfer-type and center-column units for high production. Types for performing balance milling and cut-off operations described.

15 AUTOMATIC PRESSROOM EQUIPMENT—*US Tool Co, Ampere (East Orange), NJ.* 22-page catalog 85 pictures and gives data on standard line including slide feeds, roll feeds, stock straighteners, stock reels, coil cradles, combination cradles and straighteners, air-operated feeds.

TOOLS AND ACCESSORIES

16 CARBOLOY CEMENTED OXIDE—*General Electric Co, Metallurgical Products Dept, Box 237, Roosevelt Park PO, Detroit 32, Mich.* Folder contains 18 data sheets providing general information, product, technical, and application data on Grade 0-30 available in inserts, blanks, and cylinders, for finish turning, boring, or facing at speeds above 500 fpm.

17 VISES—*Desmond-Stephan Mfg Co, Urbana, Ohio.* 16-page catalog 80 pictures and describes features of Desmond-Simplex units for variety of applications. Comparison chart shows comparable model numbers and sizes manufactured by other makers.

18 CIRCULAR FORM TOOLS AND BLANKS — *Somma Tool Co, 109 Scott Rd, Waterbury, Conn.* 15-page catalog 58 lists over 1500 items including blanks, plain cutoff tools, and cutoff and chamfer tools supplied as standard in T-5 Super HSS. Includes material on better production procedures, recommended cutting angles on various materials, and proper sharpening procedures for form tools.

19 COLLOIDAL DISPERSIONS—*Acheson Colloids Co, Port Huron, Mich.* 12-page illustrated booklet gives basic data on 'dag' dispersions; discusses advantages of use in assembly work, metalworking applications, high-temp lubrication, as a parting compound, metal casting operations, and surface coatings and impregnation.

20 PINCH JAW CHUCKS—*Cushman Chuck Co, Hartford 2, Conn.* 4-page illustrated bulletin 600 gives data on line of manually operated units designed for positive gripping for precision machining of jet engine disks and rings; large, complicated weldments; parts of large diameter and small cross section; work of irregular shape.

● DECIMAL EQUIVALENT CHART AND CALENDAR—*Dayton Rogers Manufacturing Co, 2324 13th Ave S, Minneapolis 7, Minn.* Combination chart and calendar, 12 x 20 in., starts with July 1958, runs through June 1959. Request direct on company letterhead.

21 PLUG GAGE SETS—*K&K Grinding Co, 230 Richardson St, Brooklyn 22, NY.* Chart summarizes specifications for more than 800 Go-NoGo gages. Set sizes in fractions for nominal diameters; each fraction is accompanied by the nominal diameter and six plus and six minus departures in four decimal places.

22 PORTABLE POWER TOOLS—*Thor Power Tool Co, Prudential Plaza, Chicago 1, Ill.* 47-page illustrated, pocket-size catalog 85 describes and gives specifications for portable electric and air tools, including balancers, belt sanders, bench grinders, drills, generators, grinders, hammers, impact wrenches, nibblers, nut setters, polishers, sanders, saws, screwdrivers.

HEAT TREATING AND WELDING

23 WELDING WIRE — *Air Reduction Sales Co, 150 E 42nd St, New York 17, NY.* 84-page Aircomatic pocket guide (Form ADC 873) covers wire for use with Airco's gas-shielded metal arc, or Aircomatic, welding process. Describes varieties of wire types, diameters, chemical composition, mechanical properties.

24 TITANIUM WELDING TECHNIQUES—*Titanium Metals Corp of America, 233 Broadway, New York 7, NY.* 32-page illustrated handbook outlines do's and dont's for successful welding; gives details on fusion-welding equipment and procedures, resistance-welding equipment and procedures, a study of typical weldments.

PARTS AND MATERIALS

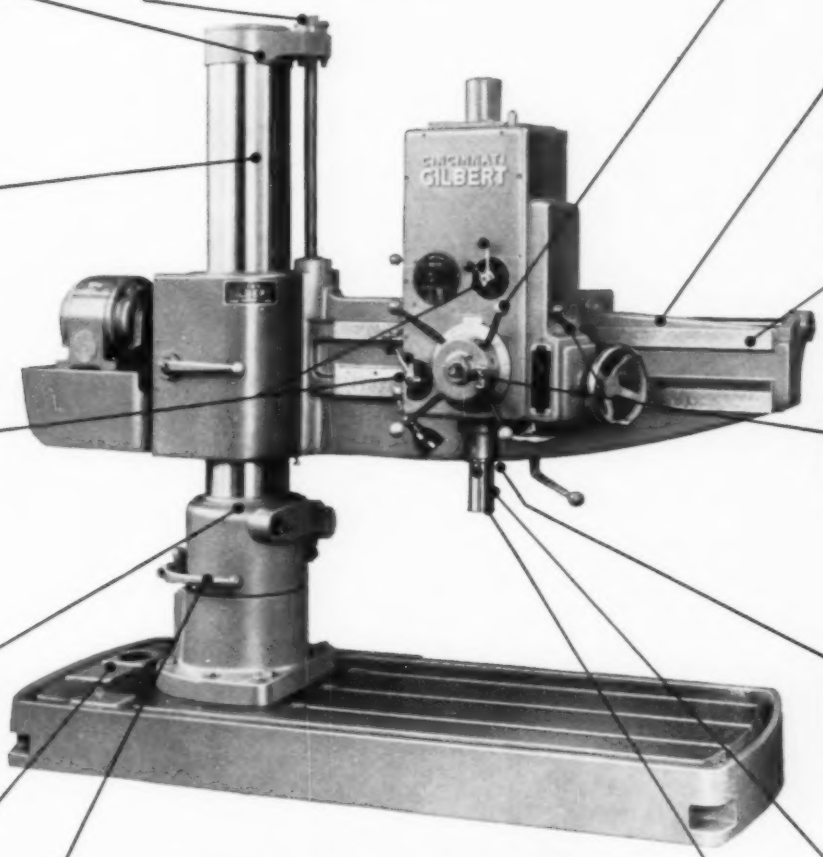
25 INVESTMENT-CAST STAINLESS AND LOW ALLOY STEELS — *Haynes Stellite Co, Div of Union Carbide Corp, 30-80 Thomson Ave, Long Island City 1, NY.* 40-page booklet describes properties of eight stainless and four low alloy steels selected for ability to meet wide range of wear, corrosion, high-temp, and structural problems, as well as high adaptability to investment-casting method.

26 ELECTRIC POWER DRIVES — *Sterling Electric Motors, Inc, 5401 Telegraph Rd, Los Angeles 22, Calif.* 64-page catalog covers expanded line of over 8000 ratings. Drive selection is simplified through use of color coded sections and new numbering system.

ONLY GILBERT RADIALS

OFFER ALL THESE FEATURES

When you order a Cincinnati Gilbert radial, you get more new features per dollar than any other radial can offer. And every feature is designed to give you maximum return on your investment—in performance, productivity, and dependability.



Safety elevating nut protects both operator and machine

Four-lever turnstile cuts machine handling time

Weight carried on opposed Timken bearings

Balanced arm resists torsion, compression, tension forces

Hardened column available

Head rides on anti-friction bearings; clamps three surfaces

Direct-reading speed and feed shifters; gears counterbalanced for easy shifting

When disengaging positive feed clutch, spindle won't drop

Adjustable ball bearing rollers on hardened ring for maintained rigidity

Full spindle support near tool; runout is less than .001"

Long heel on heavy base provides 360° stability

Hardened tang slot is an exclusive Gilbert feature

Powerful, accurate electric column clamp available

You can always see the spindle; get extra use of spindle travel

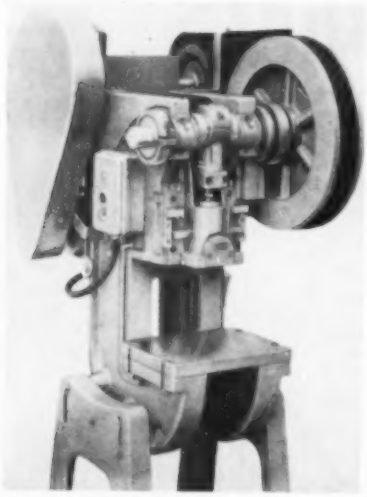
And don't overlook these additional features:

- wide range of spindle speeds for efficient tool performance;
- hardened gears throughout the machine;
- standard or special tap leads available;
- modern styling which reduces housekeeping, convinces customers that your shop is up-to-date;

Write or call for Bulletin 349.

those who buy Gilbert buy Gilbert again

THE CINCINNATI GILBERT MACHINE TOOL CO.
BEEKMAN STREET, CINCINNATI 23, OHIO

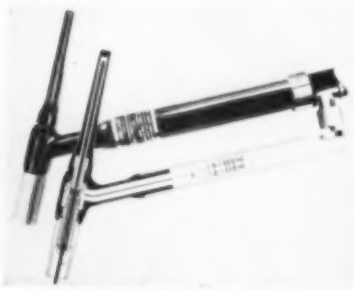


Slow-Speed Punchpress Operates Quietly, Permits Speed Changes

Fifteen-ton, slow-speed punchpress is said to eliminate the gear noise inherent in gear-driven presses of this capacity. The new drive system is not only quieter but it also permits speed changing. It employs the combined energy of two flywheels. High-friction, cog-type dacron belts and a large-dia final drive pulley transmit all the power generated.

Designed for hand feeding, it also permits deep drawing. High-accuracy roll, hopper and dial feeding are provided for continuous operation. The press operates at 100 spm; other speeds from 50 to 150 spm are obtained by changing a single pulley wheel. Standard throat depth is 6 in.; a 15-in.-deep-throat model is also available.

Kenco Mfg Co, 5211 Telegraph Rd, Los Angeles 22, Calif



Heliarc Welding Torch Features Closed Water-Cooling System

Cooling water passages are molded in the torch head of HW-18, providing complete freedom from leakage. The lighter, smaller, more-rugged torch body is made of Fiberglas-reinforced phenolic reported to have exceptional heat resistance. New gas cups have improved thermal shock and heat resistance with impact strength four times greater than usual ceramic cups. Metal sleeved cups are available for exceptionally hard use.

Unit weighs 7 oz. Improved design of collet bodies gives more efficient argon shielding, thereby conserving gas. Collets, collet bodies, cups, and caps are interchangeable with the Heliarc HW-17. Booklet F-1155 available.

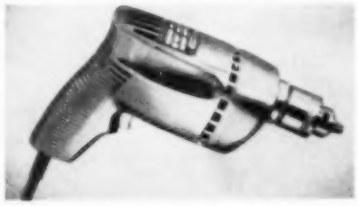
Linde Co, 30 E 42nd St, New York 17, NY

Punch and Drill Jig Set Speeds Hole Transfer

Standard set containing five collets, a sleeve, and a punch, can be used on material of any thickness from 0.001 to over 6 in., according to application. Set covers all sizes in 0.0001 from 0.240 to 1.190 inclusive.

Applications include use as drill jig; transferring holes from master templet; scribing layout lines; spotting hole from die to dieset; machine repair. Price is $37.30.

Middlesex Engineering & Manufacturing Co, Box 358, Rocky Hill, Conn

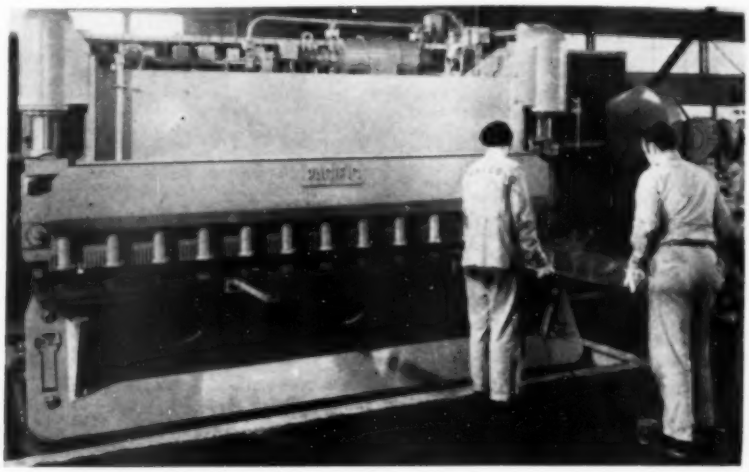


Stanley Introduces New Line Of Portable Power Tools

New line includes two ¼-in. heavy-duty drills, two ⅜-in. heavy-duty drills, one ¼-in. standard-duty drill (and drill kit) and six heavy-duty impact-type power drivers. All ampere ratings on these tools are industrial ratings. Drills range in speed from 800 rpm (⅜-in.) to 2000 and 2500 rpm (¼-in.). They are priced from $24.95 to $44.95.

The heavy-duty impact-type drivers feature controlled pressure that engages impact action and insures positive tightness of screw and nuts. Bits snap into ¼-in. hex socket. The drivers come in all speeds—from 600 to 2000 rpm for all driving needs—and range in price from $42.95 to $58.50.

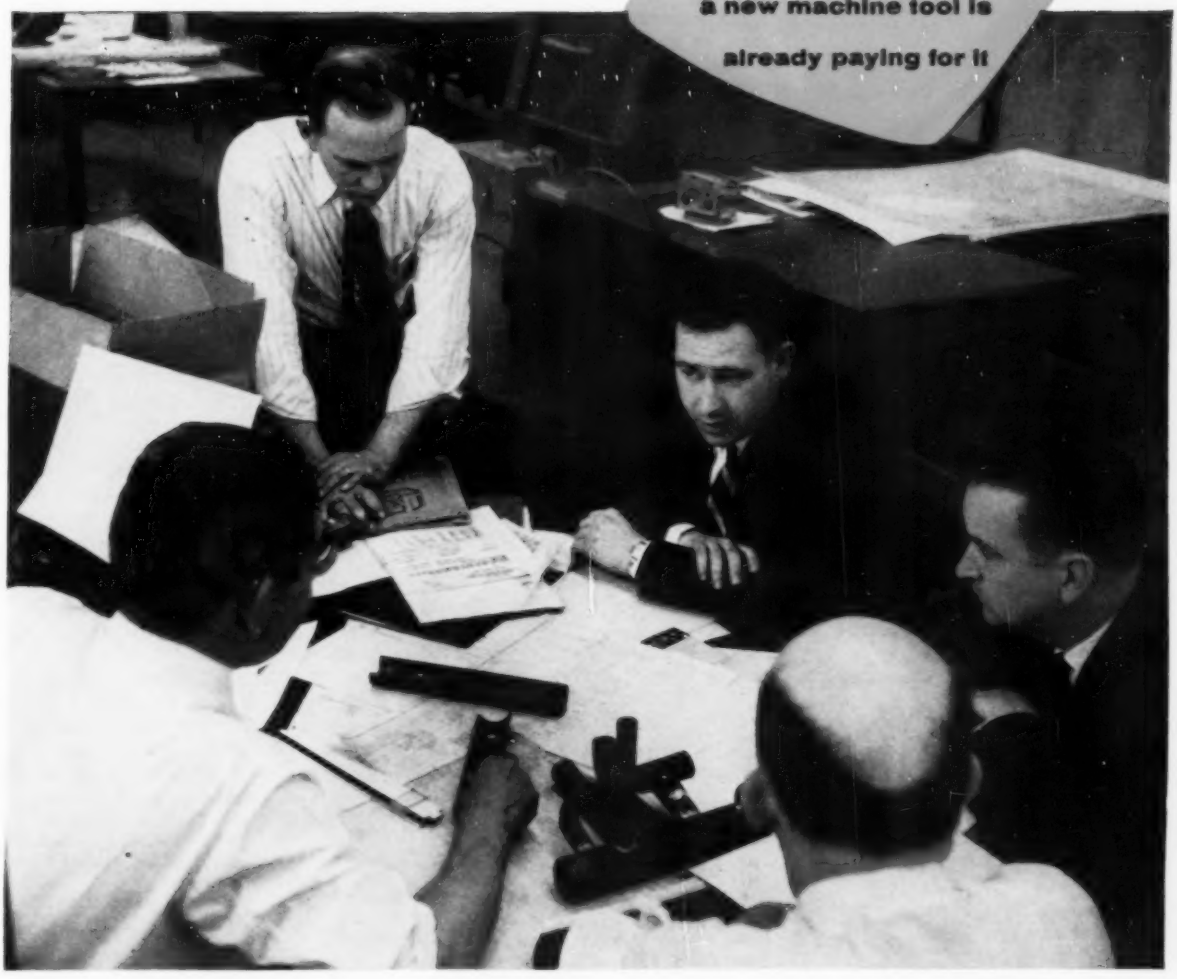
Stanley Electric Tools, Div of Stanley Works, 111 Elm St, New Britain, Conn



HYDRAULIC SHEAR, with rake angle adjustable to any metal thickness from 26 gage to ¼ in., cuts stainless, aluminum and most nonferrous alloys in sheet sizes from 4 x 12 to 7 x 19 ft. Blade is controlled by a foot pedal and can be stopped at any point throughout the stroke. Bending and bowing of drops are eliminated—*Pacific Industrial Mfg Co, 848 49th Ave, Oakland 1, Calif*

JONES & LAMSON
MACHINE COMPANY

the man who needs
a new machine tool is
already paying for it



How Much Does it Cost?

It's an important question, and often an intricate one. This man is getting the answer, and with it, the answers to other probing questions, as well. For instance: How many operations will it take to produce these parts?; What will be the production estimates?; Can automatic handling be applied?; How will my inventory be affected?; How about tooling?; Can these tolerances be held consistently?; Can I reduce floor space requirements?; Will this help improve production flow?

Other questions might deal with changeover; reducing maintenance; improving set-up times; perfecting inspection procedures. To all such questions, J & L engineers can give you authoritative answers, and thereby supply you with data that is vital to your production.

Let us help you map out a sound, sensible replacement program, starting with an in-plant production survey. Write to Jones & Lamson Machine Company, 502 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Gulton's New Ultrasonic Drill Has 100-w Power Output

Glennite U-602, superseding the 40-w originally developed, is designed for rapid drilling of intricate shapes into hard, brittle, and unyielding materials. It can also be used for lapidary work as well as for trepanning operations. Where a number of small, closely spaced holes are to be drilled, a tool can be made to position and drill them simultaneously in one operation.

Model includes two basic units—a drill assembly and an ultrasonic generator. Drill assembly consists of a special Glennite piezoelectric transducer coupled to a tool mount by a mechanical transformer, and a drill mount and automatic adjustable feed mechanism. Operating on a frequency of 20 to 22 kc, the high efficiency of the transducer and impedance matching system provides high cutting speeds with minimum of power.

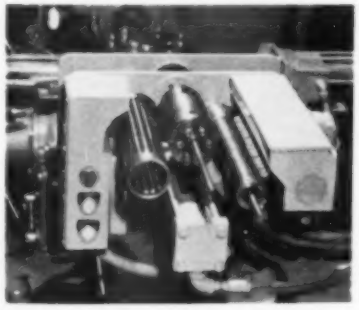
Gulton Industries, Inc, 212 Durham Ave, Metuchen, NJ

Custom-Made Workholding Devices Available in Ceramic Materials

AlSiMag ceramic or Grade A Lava is used in production of custom-made jigs, fixtures, support rings, and workholding devices that are reported to have excellent thermal shock resistance and dimensional stability. Parts reportedly have demonstrated superiority in induction heating, brazing, welding, soldering, and other manufacturing processes involving high temperatures.

For experimental purposes, short runs, or where small quantities are involved, designers can machine their own from Grade A Lava (an inert material) which can be cut to very accurate dimensions with ordinary tools for working wood or soft metals. Material is available in blocks up to 6 x 12 x 20 in. Larger sizes may be furnished on special request. Completed Grade A Lava designs may be hardened by heat treating or used in the unfired state. If customers have no heat treating facilities, company will fire parts at nominal cost, machine them also if desired. Bulletin 576 available.

American Lava Corp, Cherokee Blvd & Mfgrs Rd, Chattanooga 5, Tenn

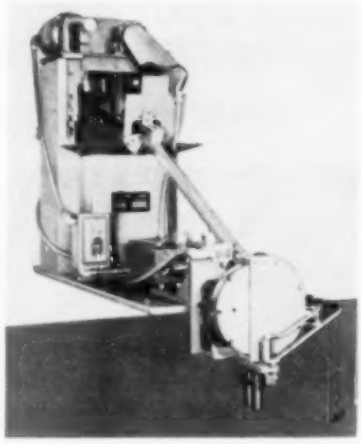


Automatic Control Unit Directs Turret Lathe Functions

The De Silvey Director control unit performs automatically all turret lathe functions previously done by hand. Any turret lathe equipped with the device can be operated fully automatically, semi-automatically, or completely manually. Operator can control all operations from a panel.

Feed rate of the Director ranges from zero to a max of 100 ipm, and different feed rates can be established for front or back tool. Headstock spindle speeds, ram, cross-slide functions, and all operations are pre-selected by a six-position drum and a multi-switch assembly called a sequence selector. The six positions of the drum correspond to the six hex turret positions; each position energizes certain switches, establishing the functions to be performed at each hex turret station. No cams are required to obtain any operation. Details in Catalog 12.

De Silvey Corp, Pennsylvania Ave, East Aurora, NY

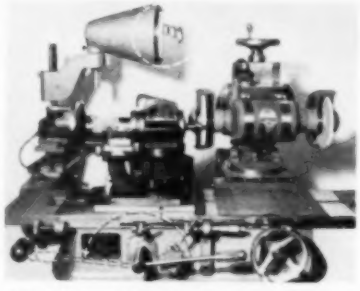


Elevating Hopper Handles Small Metal and Non-Metal Parts

Completely self-contained, the model 5000 bench-type elevating hopper handles a wide range of small-sized metal and non-metal parts. The high-speed feeder has a cleated elevating belt positioned in a large $1\frac{1}{2}$-cu-ft hopper, which gently picks up the parts and deposits them on the orienting rolls. The roll feed automatically positions the parts and deposits them in a feeding chute at a predetermined feed rate. Feeding chute delivers parts to the production machine or work station. Non-oriented parts are returned to hopper.

Feeder can be set up to handle rolling forms up to 1 in. dia and $\frac{5}{8}$ in. long; sliding forms to $\frac{1}{2}$ in. dia and $1\frac{3}{4}$ in. long; and headed forms to $\frac{1}{2}$ in. dia and $1\frac{3}{4}$ in. long.

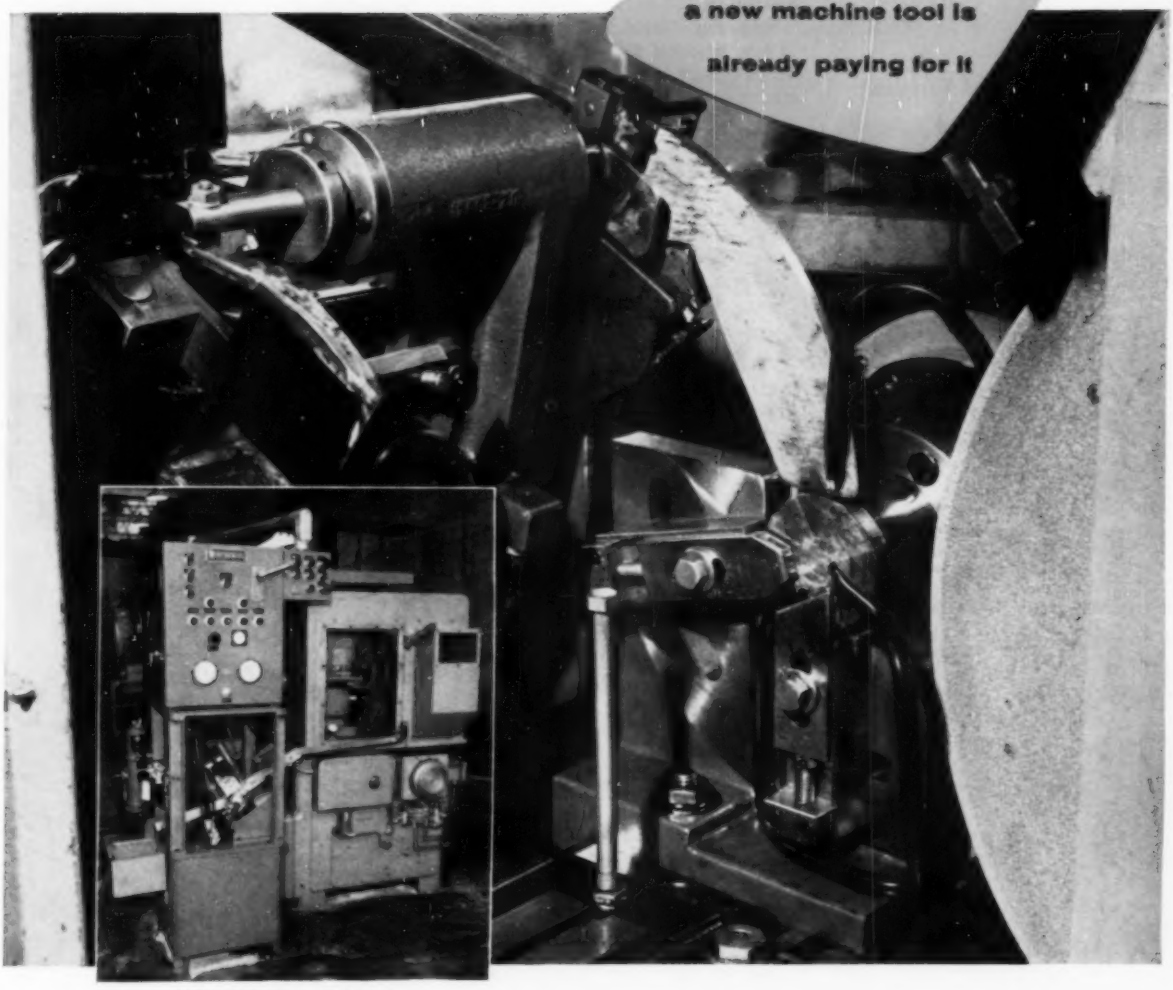
Production Feeder Corp, 3130 Johnnycake Ridge Rd, Mentor, Ohio



OPTICAL COMPARATOR ATTACHMENT, for company's R-O Universal Form Relieving Fixture and Grinder, mounts on a bracket attached to the grinder. It swings from an out-of-the-way position, bringing the lens over the work and projects the ground profile, with 20:1 magnification, on the 8-in.-dia screen—*Royal Oak Tool & Machine Co, 29800 Stephenson Highway, Royal Oak, Mich*

JONES & LAMSON "AUTOMATION"

the man who needs a new machine tool is already paying for it



Model E Form Grinder

Safe, Sound & Simple

An example. Grind the ball groove on $1\frac{7}{16}$" dia. inner races to a 6 to 8 mu-in. finish on the high band. Consistently hold tolerances of .0016", and do it at a production rate of at least 286 pcs. per hour. Sounds tough, but it's relatively simple. Here's why: — The built-in automatic features of this Model E Form Grinder include either diamond or crush wheel dressing, or the new PFC (Perpetual Form Control). And the automatic handling devices designed by J & L are many and varied.

More evidence. Another customer had this to say: "Drawings submitted for our approval, before construction, showed that every possibility of waste motions, part jamming, safety hazards and improper part orientation was anticipated and eliminated. The mechanisms devised are sound and simple."

Write today for information on J & L's approach to "Automation", Jones & Lamson Machine Company, 502 Clinton Street, Springfield, Vermont.

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Nut Runner Runs and Torques Nut in One-Half Second

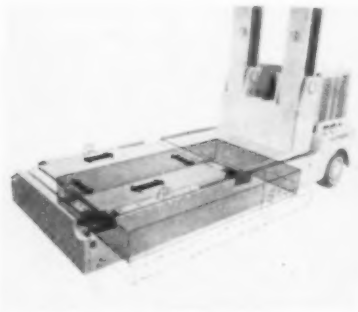
The Nelson Nut Runner is designed for running and torquing screws and nuts in the low torque range from 6 to 40 oz-in. It is air powered and weighs less than one pound. Design involves transferring controlled air pressure to a piston. This pressure is transmitted to the output shaft through a rack and pinion. A nut can be run and torqued in one-half second. The speed-controlled spindle turns eight times with each trigger action. This action, combined with very low output inertia, permits accurate torquing in the low torque range. Bulletin available.

Iseman Corp, Engineering Div, Eleventh & Dakota, Sioux Falls, SD

Improved Shock-Resistant Steel Is Tough But Hard

LaBelle HT tool steel is an improved shock-resistant steel that offers toughness at high hardness levels. This low-alloy steel has been developed for applications requiring unusual resistance to shock or impact such as shear blades, impact extrusion tools, cold heading dies and punches, and coining and striking dies.

Crucible Steel Co of America, Oliver Bldg, Pittsburgh 22, Penna

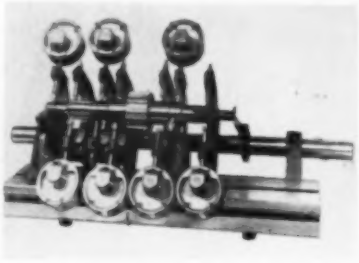


Three-Way Die Handler Loads 40,000-lb Dies

Model TLOH-20 incorporates both end and side loading. Hydraulically actuated hooks operate 12 in. beyond the end of the platform and have 112 in. of travel. Winches are eliminated; hydraulic rams are used to pull dies onto truck bed. Use of rams with travel speed of 8 to 10 fpm reduces loading time as well as length of truck, enabling it to maneuver in 127-in. intersecting aisles.

Bed of platform is 27 in. from floor in low position and can be raised to 62 in. Unit, equipped with power steering, has speed of 3 mph loaded.

Automatic Transportation Co, Div of Yale & Towne Mfg Co, 149 W 87th St, Chicago 20, Ill



GAGING FIXTURE, the CEJ Combination-Chek 5000, offers the possibility of building inexpensive checking units from standard parts. Principal application is checking turned and ground circular components; several measurements can be made at same time. Parts from 0.200 to 2¾ in. and up to 20 in. long can be handled—*C E Johansson Gage Co, Dearborn, Mich*

Instrument Measures Waviness on Symmetrical Surfaces of Rotation

The Wavometer measures waviness on symmetrical surfaces of rotation. It will handle ID's and OD's of surfaces up to 18 in. in diameter, and provides for angular adjustments of 30° above horizontal to 70° below.

Instrument gives meter reading of the RMS average height of the waves in two wave bands, directly in micro-inches. In addition, an oscilloscope shows the general shape and spacing of the waves in either wave band. A loudspeaker transforms the surface irregularities into sounds, and deviations from the normal are easily detected by the operator.

Micrometrical Mfg Co, 345 S Main St, Ann Arbor, Mich

Spitfire Introduces Compact Semi-Automatic Lapping Machine

The Spitfire 9-in. flat lapping machine features a 9-in. close-grained cast-iron-alloy lapping plate. Designed for semi-automatic operation, the machine measures only 13 x 18 x 10 in. yet is reportedly capable of turning out volume production to tolerances of 11.6 millionths of an inch.

For automatic operation, an automatic timer is also incorporated for control of lapping cycle. A custom-designed portable mounting stand is available as optional equipment.

Spitfire Tool and Machine Co, 2931 N Pulaski Rd, Chicago 41, Ill

GEARED FLEXIBLE COUPLING, type MC, for shaft diameters up to ⅞ in., is designed for use as a motor coupling—for transmitting electric motor power to pumps, generators, and speed reducers. Coupling sleeve is of one-piece design, and coupling is enclosed in a two-piece metal cover. Folder 2875 available—*Link-Belt Co, Dept PR, Prudential Plaza, Chicago 1, Ill*

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OPTICAL COMPARATORS

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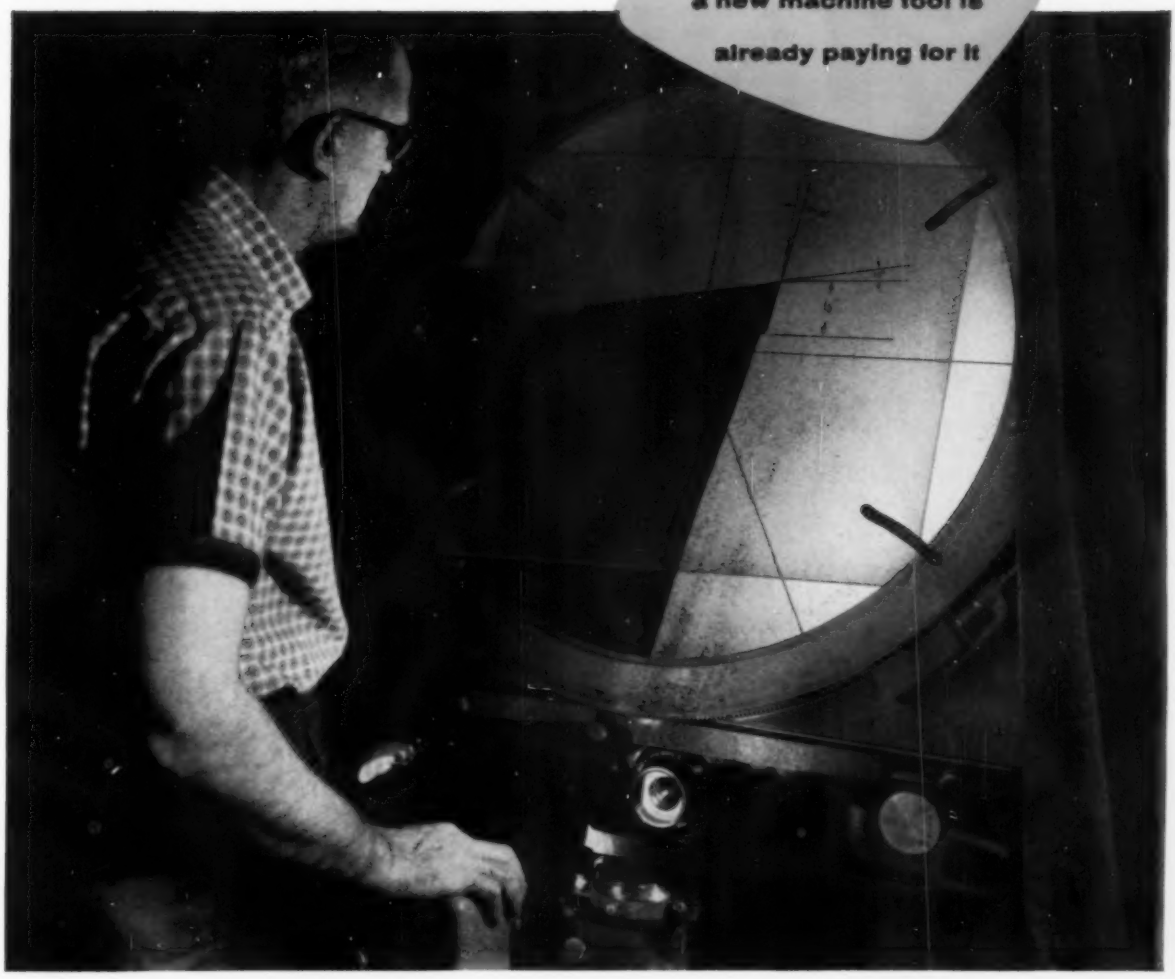


Tool inspection is easy — same with "hot" stuff

Controlling dimensional limits of new and resharpened cutting tools is mandatory for every manufacturing plant. And it's *so* easy to do with a J & L Optical Comparator. In fact, the photo above tells the whole story. Just set up the tools and look at the precisely magnified image. Extreme accuracy, ease of operation and low maintenance are the keys to this operation. And they inevitably result in improved quality and lower costs.

In the atomic energy field, too, the same features make the unusual job simple. A customer says: "It is highly advantageous to have J & L comparators in a 'hot' lab — they can be moved from station to station without impairing accuracy, and are easily modified for remote operation."

Whatever your inspection problem, write Jones & Lamson Machine Company, 502 Clinton Street, Springfield, Vermont.

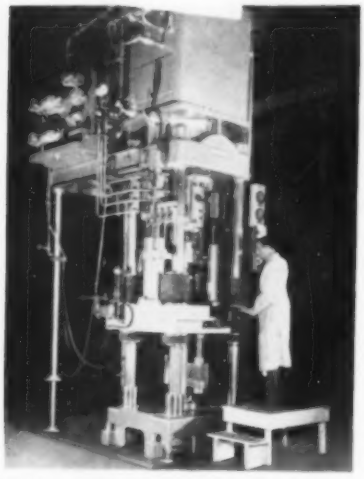
Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Portable Welder Introduced For Semi-Automatic Operation

Colmonoy semi-automatic welder is designed for rapid, accurately controlled application of hard-facing wire electrode.

Features include a 14-ft flexible shaft for greater working range from one position, and a double-range arc length control circuit for greater operating range and better welding control. Remote-control inch button, located on the electrode holder eliminates need for leaving the work to advance the electrode as required during arcing. Model operates from any welding machine 300 amps or larger. Power source may be ac-dc rectifier, motor-generator, gas drive, or constant potential machine. Two connections—electrode lead to machine and machine lead to ground—complete the hook-up requirements.

Wall Colmonoy Corp, 19345 John R St, Detroit 3, Mich



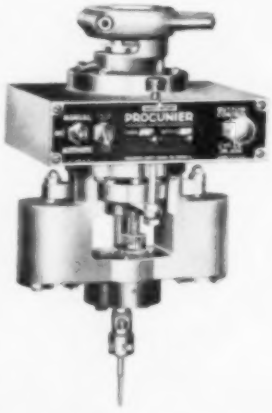
Hydraulic Compacting Presses Feature Simplified Design

New hydraulic powder metal compacting presses, Model 714, are basically single-acting presses with single upper punch motion delivering the full pressure of the rated capacity by means of the downward stroke of the hydraulic ram, and a hydraulically supported die table that provides adjustable upward resistance to motion of the upper punch. This movable die table provides the equivalent of pressure from below for simple straight-wall parts. The bottom punch, which extends up into the die, is fixed.

Depth of fill is adjusted through threaded nuts on two of the main tie rods. Thickness of the compact is determined by the length of the upper punch stroke, which is adjusted by means of a collar encircling the upper punch ram.

These new presses are available with pressing capacities of 100, 200, 300 and 500 tons.

F J Stokes Corp, Press Div, 5500 Tabor Rd, Philadelphia 20, Penna



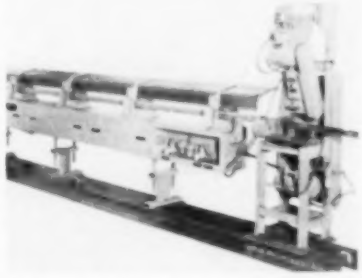
Leadscrew Tapping Attachment Powered by Standard Drillpress

Designed to produce uniform precision threads with minimum effort and skill, this leadscrew tapping attachment derives its power or rotation from standard drillpresses and uses 110-125-v, ac current to operate twin air cylinders supplying tapping and reversing pressures. Air pressures range from 18 to 40 psi.

The touch of a pushbutton feeds the tap gently and automatically through its entire preset cycle. Attachment can be used in five different ways—automatic, pushbutton cycle, pushbutton jog, foot or fixture switch cycle, foot or fixture switch jog. A conveniently located safety-return button returns the tap to top of stroke should the tap bind, hit an obstruction, or if the hole is not present in the piece.

Leadscrew assemblies can be interchanged in seconds and are available in any standard pitch from 20 to 96. Tap capacity is from No. 00 to 3/16 in. in steel, 1/4 in. in softer materials. Max leadscrew travel is 1 3/16 in. Depth of threads can be held to approx 0.005 in.

Procunier Safety Chuck Co, 18 S Clinton St, Chicago 6, Ill

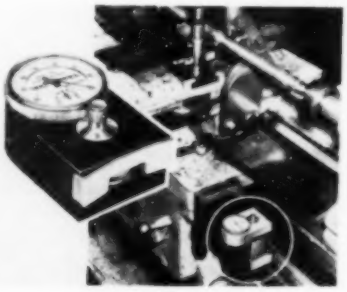


Automatically Fed Cutoff Machine Cuts Round Tube or Pipe

Swing cutoff machine is automatically fed. With this machine it is possible to store the material and have it fed, stopped and clamped. Clamping is done by air as operator swings cutting head into position. Capacity is 1.9-in. round tube or pipe. Either ferrous materials, cut with abrasives—or nonferrous materials, cut with metal wheel and mist coolant system, may be handled on this unit. Machine can be completely automated if desired.

The setup illustrated cuts $\frac{5}{8}$-in.-OD x 0.062-in.-wall tube. Part-to-part or floor-to-floor time is 2.4 sec per piece for 10 pieces. Re-load time between bars is 7 to 10 sec, after which the 10-piece cutting cycle is ready to be repeated.

Wallace Supplies Mfg Co, 1300 Diversey Pkwy, Chicago 14, Ill



New Measuring Indicator Features Infinite Travel

Trav-A-Dial, for use with any machine tool, measures complete longitudinal travel of the machine as

JONES & LAMSON
MACHINE TOOLS

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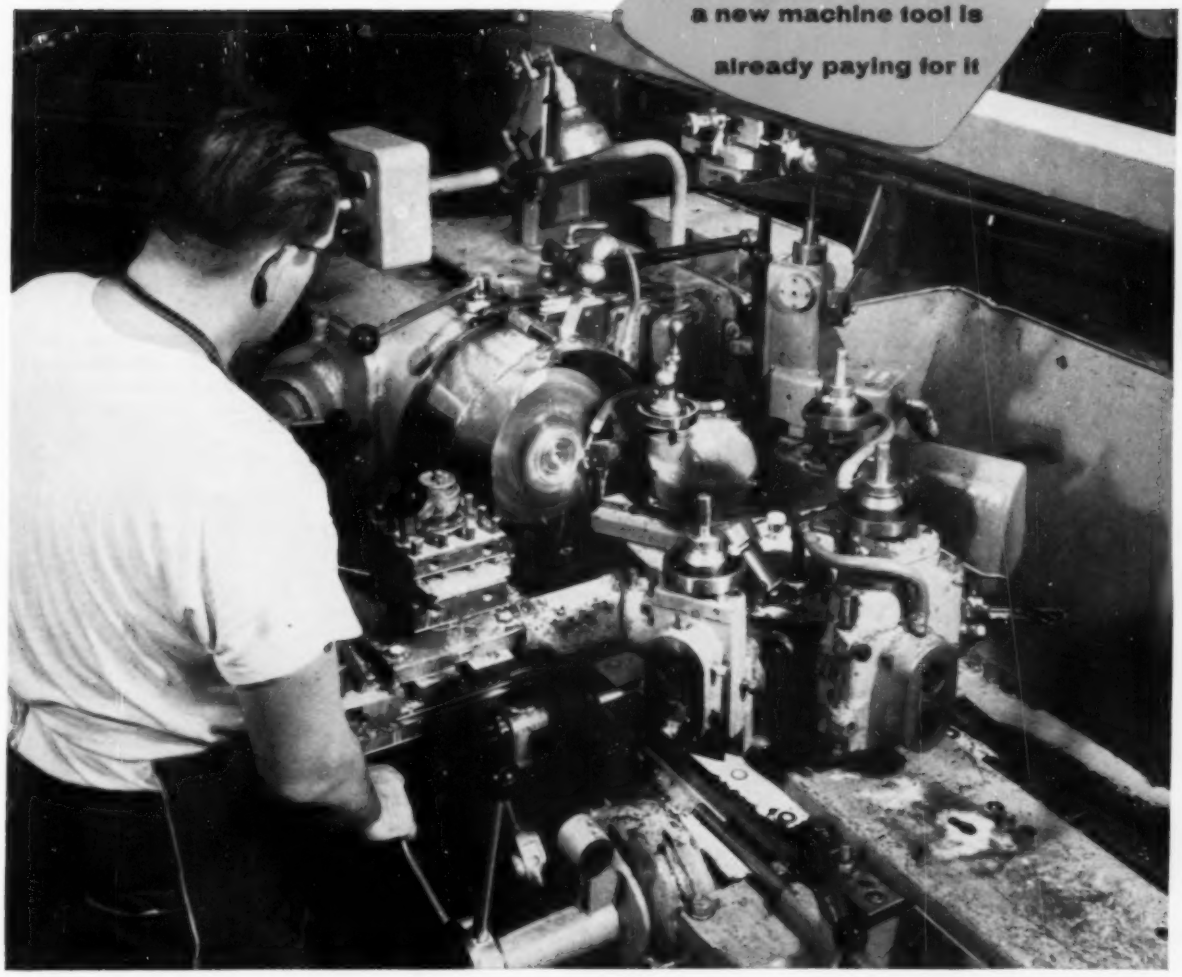

Turret Lathe Tracing Pays off Double — and More!

It is hard to select the "best" feature of a J & L turret lathe which is equipped with a tracing unit. It could be the cost saving factor, as in the job illustrated above. Stainless steel forgings are first rough-machined with tools from the hexagon and square turret positions. Then, *in the same chucking*, the tracer is engaged and the parts are contoured to a 16 mu-in. finish at better than 1000 SFM. Manufacturing costs were cut 74%.

Another customer points out broader advantages. He says: "My turret lathe with its tracing attachment is the most versatile machine in my shop. It's a bar machine, a chucker, an engine lathe, and a shaft and cross-center duplicator, combined. No machine could do more, or produce more profits for me."

Write for detailed information. Jones & Lamson Machine Company, 502 Clinton St., Springfield, Vermont.

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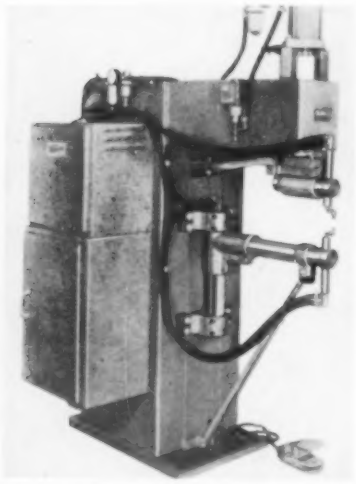
well as transverse and vertical travel on certain tools.

Instrument reads any length in 6-in. increments, furnishing a visual record in inches, hundredths and thousandths on a large, easily read dial. No plungers are used, no measuring rods or other devices are required. Traverse is totalled on the indicator by accurately recording revolutions of a slip-proof wheel which contacts the way of a lathe or any smooth surface of other tools. Instrument is accurate within 0.001 in. in 6 in. of travel and repeats unfailingly, according to manufacturer.

Instrument can be retracted when not in use. Special spring-loaded, dovetailed mount also permits removal of the unit for use in other locations or on other tools. Literature available.

M E Hodge Corp, 36 N Raymond Ave, Pasadena 1, Calif

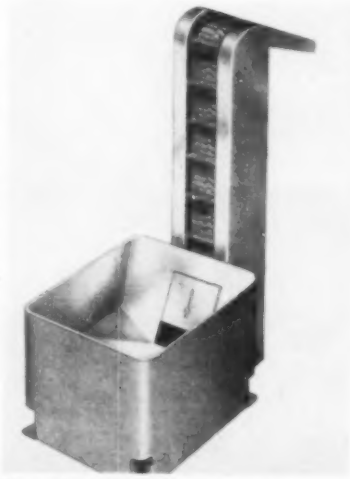


Welder Serves Sheet-Metal, Wrought-Iron and Wire Fabricators

Model A-R resistance spot welder, designed for the sheet-metal, wrought-iron and wire fabricating industries, features roller-bearing ram, high-current electrical design, high speed and extreme ruggedness. Roller-bearing ram permits precision alignment of the work. An independent air valve brings the ram down for fine electrode adjusting.

Machine has a current capacity of 75 kva, adequate for welding 16-gage commercial aluminum and 7-gage cold rolled steel. Maximum short-circuit secondary current is 26,000 amps. A foot switch allows selection of either manual or high-speed automatic operation.

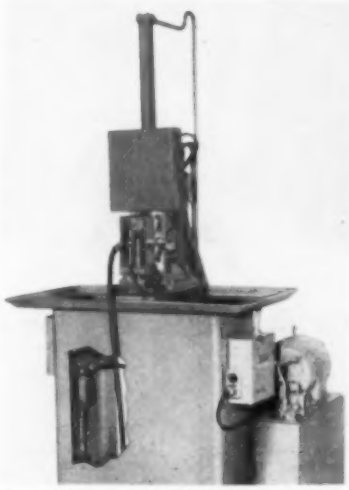
AlpMI Spot Welder Mfg Corp, 1058 Pacific St, Brooklyn 16, NY



Elevating Conveyor Permits Floor-Level Loading

Vertical design of this elevating conveyor saves floor space and permits floor-level loading. The result is gentler handling of the parts. The outlet door in the bin is adjustable to control flow of parts to conveyor belt. Self-cleaning cleats practically eliminate slowdowns caused by snarling or nesting of parts. Hopper capacity is approx 5 cu ft. Bin is made from 3/16-in. plate with a reinforced top ring.

Automation Devices, Inc, VFC Div, Erie, Penna



Bench-Mounted Machine Surface Broaches Small Metal Parts

Bench-mounted broaching machine is designed for surface broaching of small parts. It accommodates interchangeable broaches up to 2½ in. wide, and can also be used for internal broaching. The hydraulically powered ram is guided in accurately machined ways to insure precision work. Accuracy to 0.0002 in. and surface finishes to 10 mu-in. are possible, even at high ram speeds.

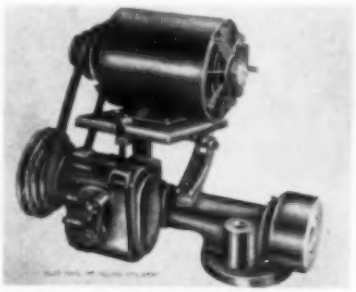
The basic machine is a universal machine tool, and is available with various standard and special accessories, attachments and fixtures. Tilting or shuttle-type tables are available for mounting on the platen. Machines are made in various capacities, ranging from 2000 to 6000 lb. Ram stroke is from 6 to 24 in.; ram speeds from 20 to 60 fpm. Stroke can be adjusted to meet job requirements.

Ty Miles, Inc, Box 446, Elmhurst, Ill

Slitting and Trimming Knives Cut Light Gage Steels

Tungsten carbide rotary slitting and trimming knives have the extremely hard cutting edges needed to produce straight and true edges with minimum burr when slitting or trimming light gage silicon or carbon steels. They are made in two styles; solid tungsten carbide, or with a circular tungsten carbide cutting edge on an alloy steel body. Wide range of sizes available.

Cowles Tool Co, 2086 W 110 St, Cleveland 2, Ohio



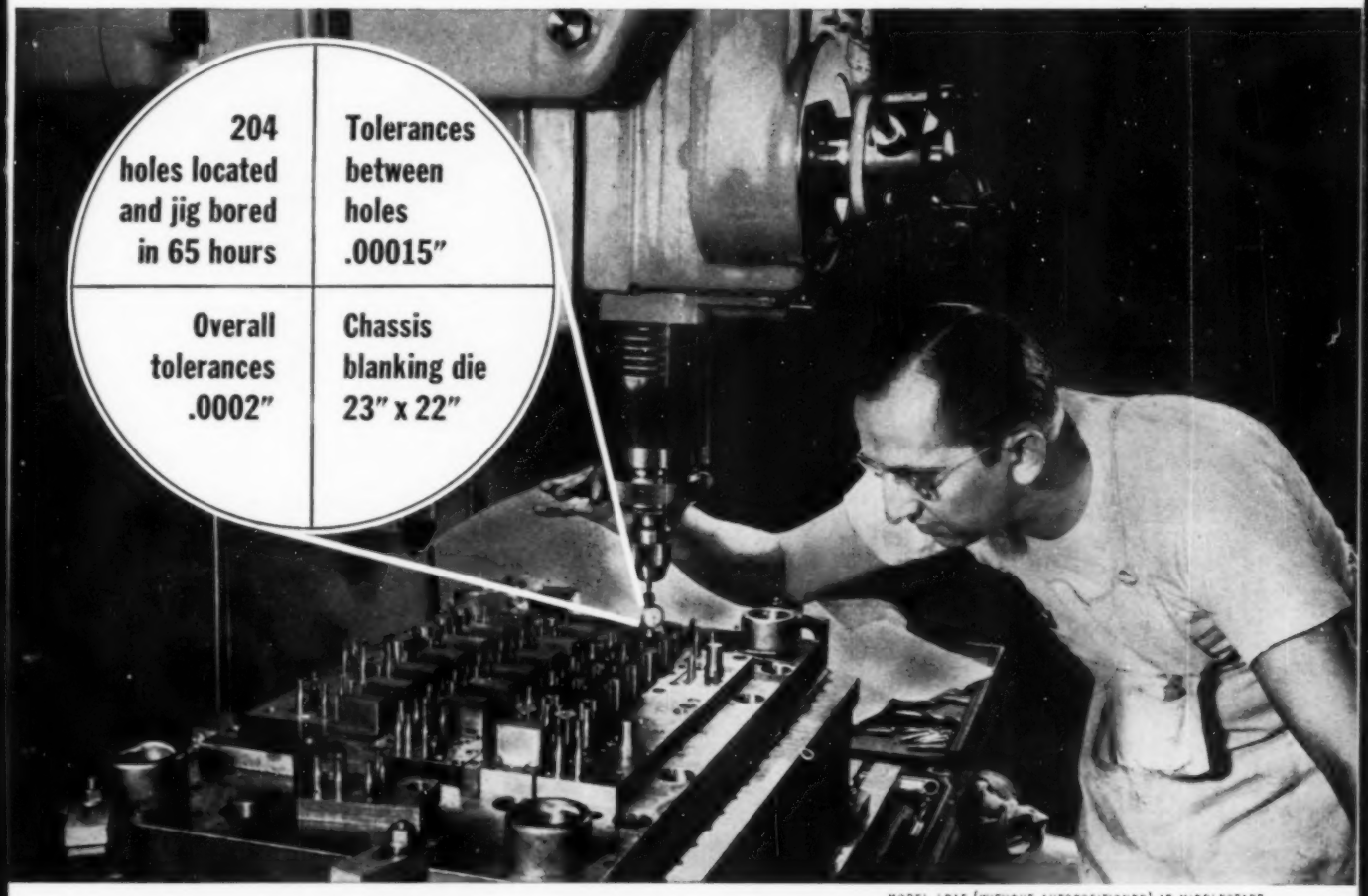
Milling Attachment Fits Wide Variety of Machine Tools

Model M milling attachment can be mounted on lathes, milling machines, turret lathes, planers, and boring mills, or can be supplied as original equipment on special machines. The attachment is suited for keyseating, milling, slotting, drilling, shaping, boring, splining and squaring. Spindle has No. 3 Morse taper and provides six different speeds, ranging from 200 to 900 rpm. Spindle height is 2 in. and capacity is a 1-in. end mill.

Total weight, including motor, is 63 lb. Price of $245 includes ½-hp motor, pulleys, V-belt and draw bar. Specifications available.

Alva Allen Industries, Clinton, Mo

Why Lindner Optical Jig Borers have changed so many ideas about jig boring


204 holes located and jig bored in 65 hours
Tolerances between holes .00015"
Overall tolerances .0002"
Chassis blanking die 23" x 22"

MODEL LB15 (WITHOUT AUTOPOSITIONER) AT MIDDLESTADT

You're looking at the *third* Lindner Optical Jig Borer at work for Middlestadt Machine Co., Baltimore. And you'll see *seven* Lindners at General Electric; *five* at North American Aviation; *three* at Avco; others at General Mills, Lockheed, Vectron, Bendix—and a growing list of more precision-minded plants. Here's why:

Optical measuring system does not depend on lead screws, gage blocks, bars or limit switches—is permanently protected against mechanical wear. Only a light beam touches helically scribed cylindrical measuring scales which are independent of table movement mechanism and are *immovable* in axial direction.

AUTOPOSITIONER® enables operator to preselect table position for next hole while one boring operation is in progress—eliminates non-productive time between holes. As one hole is completed, table moves in rapid traverse to the next preselected position. (Available only on model LB15A)

Photo-electric optical centering device minimizes visual fatigue and errors in settings—permits initial and repeat settings guaranteed accurate within .00015" and readings in .00005".

Projection screen eliminates operator eye strain and bending—helical line from measuring scale is projected on 2½" x ¾" screen which operator reads in standing position without eyepiece.

Automatic table clamping prevents errors in clamping and unclamping table between movements.

Lindner Optical Jig Borers are available in two models:
LB15A with Autopositioner—Table size 44" x 24"
LB14—32" x 16" (without Autopositioner)

● ***Send for 25-minute movie film demonstration***

KO CO. INC. INDUSTRIAL IMPORTERS

KURT ORBAN COMPANY, INC.

36 Exchange Place, Jersey City 2, New Jersey

Bringing blueprints to "life" in the shop means time-wasting interpretation and re-interpretation. But—to punch any hole with a Wiedemann Turret Punch Press—the operator needs only the X and Y hole dimensions, and the turret station number as listed on a simple work chart.

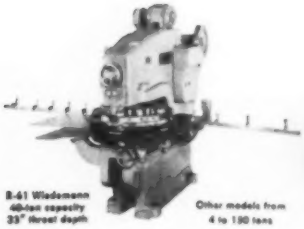
Then, in a matter of seconds, he merely:

1. Turns the turrets to required station number—once per tool size.
2. Positions back gauge to Y dimension.
3. Places a quick-acting stop at X dimension . . . and punches the hole(s).

Any number of holes are accurately located and pierced in rapid sequence. From 12 to 32 different punches and dies are in the turrets ready for use, and any of hundreds of other tools can be substituted in two minutes or less. Tools can include rounds, squares, louvers, groups, extrusions, knockouts . . . from 0.093" dia. to 7" dia. . . . larger openings and notches are produced easily with a series of "hits."

High speed Wiedemann operation without layout or setup . . . plus low cost tooling . . . plus use of a simplified work chart adds up to savings of 60% to 90% on short to medium run piercing.

These savings can be yours. Send drawings of your work for time study, and write for Bulletin 301.



Ask any **WIEDEMANN** *User*

WIEDEMANN
MACHINE COMPANY
TURRET PUNCH PRESSES

4217 Wissahickon Ave. Philadelphia 32, Pa.

ANCHOR BOLT FITTING, called Deco Anchor, is flush with the floor until installation of equipment. An oblong nut in the box-like fitting attached to the top of the anchor bolt moves far enough in all directions to compensate for usual error in setting anchor bolts. Machine is attached to fitting by a stud of desired length. Units are available as fittings only or complete with anchor bolt and stud to specifications in sizes from ⅜ to 1½-in. bolt dia—*Decatur Engineering Co, 519 E William St, Decatur, Ill*

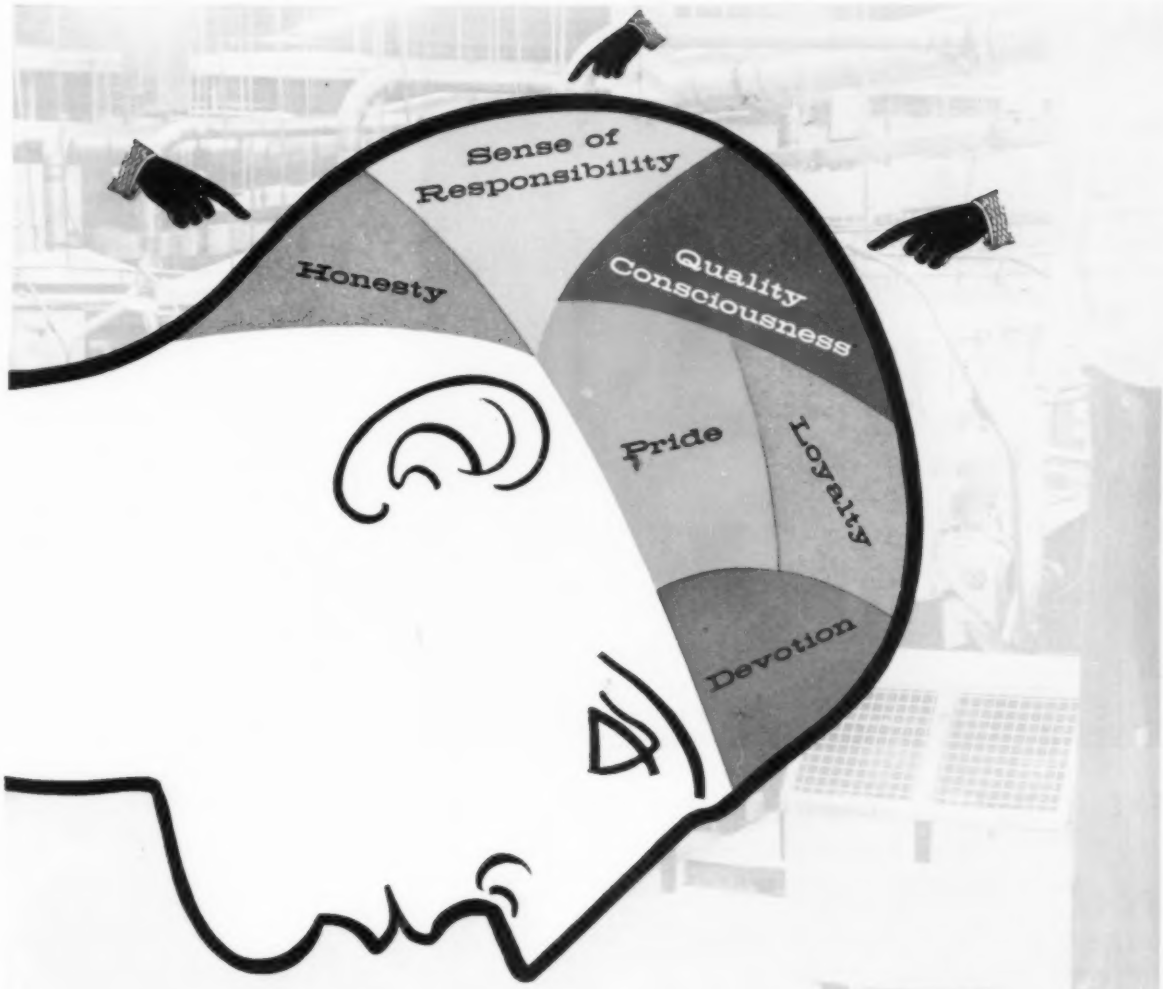
Split sleeves, designed for use with straight shank tanged drills, are offered in four taper sizes—ASA taper shanks No. 1, 2, 3, and 4. They will handle the most widely used drill sizes, including fraction sizes 1/16 to 1 in., wire gage sizes No. 1 to No. 52, and letter sizes A to Z.

Cleveland Twist Drill Co, 1241 E 49th St, Cleveland 14, Ohio

Machinist vise, Simplex line, has hardened tool steel jaw inserts that eliminate screw holes and screw heads in jaw surface and increase gripping area. Jaws are firmly pinned on and can be readily replaced when worn. Positive locking of swivel base models in any position is assured with a corrugated head and forged steel bolt meshing into V-shaped grooves in the base.

Desmond-Stephan Mfg Co, Urbana, Ohio

Spir'Ator safety return device for automatic return of the motor carriage which houses the saw blade of the GA model radial-arm woodwork-



Quality Control at Pipe Machinery

Rests Right Between Each Operator's Ears

At Pipe Machinery we have no need for floor inspectors . . . no need for control charts to insure the high precision and accuracy of our gages. Our quality control rests where it belongs—right between the ears of the people who do the actual work. Through every step in the manufacture of a Pipe Machinery gage, all our operators feel full and complete responsibility for the quality of the product they are helping to produce. Each man and woman is a self-appointed guardian of the company's reputation. They all have their own inspection equipment. We also maintain a fully equipped constant temperature laboratory where large gages and extremely close tolerance gages are checked.

Do stop in and visit us next time you are in the vicinity. We'd be proud to introduce you to our team of reliable craftsmen . . . a team devoted heart and soul to the job of turning out gages of unsurpassed excellence.

For further information on our complete line of fine gages, write us on your letterhead.

THE PIPE MACHINERY COMPANY *29100 Lakeland Blvd. • Wickliffe, Ohio • Greater Cleveland*

THE *Greist* MANUFACTURING COMPANY

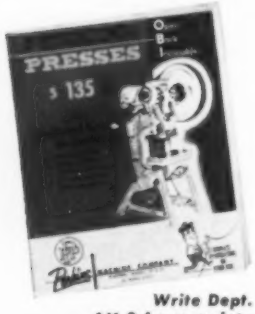
USES PERKINS PRESSES . . .

. . . for ECONOMY • ACCURACY • DEPENDABILITY

Greist are manufacturers of the world's finest sewing machine attachments • metal stamping and assembly specialists since 1871. Greist uses approximately 75 Perkins Presses from 10 to 60 tons capacity, many of them in production of a nationally famous camera.

Perkins Presses offer you speed, accuracy, safety, dependability and economy in stamping and pressing operations. Check on Perkins Presses before you decide to buy. See why some of the best known names in industry, such as Greist, Dixie Cup, Talon, Inc., Acme Chain, Sylvania and many others use Perkins Presses.

Look into the many features you get in Perkins Open Back Inclinable line – most popular type in use! 10 models, from 5 to 135 tons, mechanical or air safety clutches, bronze bearings, semi-steel frames, automatic release brakes, 1-man inclining, piston knockouts – to mention only a few.



Write Dept. AM-2 for complete Technical Information.

For expert on-the-spot press engineering assistance, call in a Perkins Field Engineer.

PERKINS
MACHINE COMPANY
WARREN, MASS., U.S.A.

ing machines is now available for two lines of heavy industrial machines. Self-contained spring-actuated unit immediately returns the cutting mechanism to a rear idle position as soon as the operator relaxes forward pull on the carriage.

DeWalt Division, American Machine & Foundry Co, Lancaster, Penna

Interchangeable counterbores consist of three pieces—high-speed cutter, holder, and pilot; cutters and pilots can be quickly interchanged from one size to another. They are available with either straight shank or taper shank holders. Also furnished in sets, with seven different assortments to choose from, including 32nd sizes for tool and die shops.

Chicago-Latrobe, 411 W Ontario St, Chicago 10, Ill

Adjustable motor base, Model MB-1 designed to provide quick belt take-up for variable speed fhp drives, has a max 1½-in. adjustment, telescoping slide, and locknuts to limit movement. Knurled 1½-in. knob and adjusting screw assure positive settings without slippage; rigid base can be mounted in any position. Unit handles all motors up to size 42 NEMA frame.

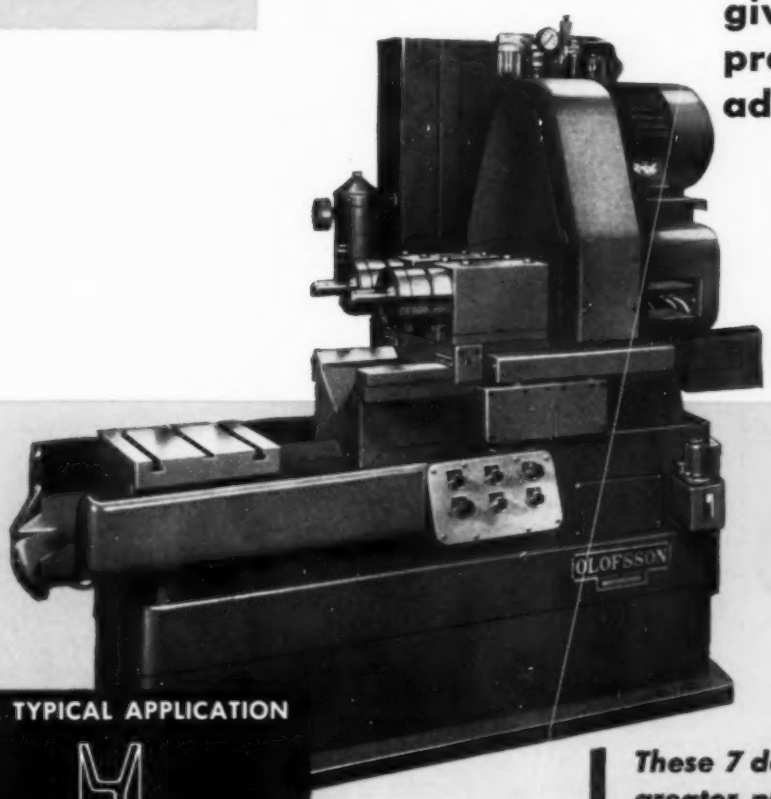
Rampe Manufacturing Co, 14915 Woodworth Ave, Cleveland 10, Ohio

R & R deburring tool has been introduced in two types, each in a full range of sizes to 1½ in. dia. Model 955 uses spring tension against the blade to effect cutting action; Model 956, against the body. Both are adjustable to regulate depth of cut. Designed for operation at high speeds, tool can be used in a drill-press, portable drill, or can be

"Don't worry Fred—it's not a cold—just a little touch of hay fever!"

NEW design

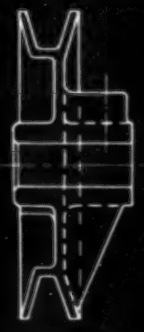
OLOFSSON Precision Boring Machine gives added production advantages



OLOFSSON Model 30-012 Single End Precision Way Boring Machine

PROVIDES FAST, ACCURATE ROUGH AND FINISH BORING, FACING, CHAMFERING, TURNING AND GROOVING.

A TYPICAL APPLICATION



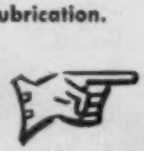
Finish bore, turn o. d., groove, and chamfer zinc die-cast pulley.

Rate of Production: 190 pieces per hour.

These 7 design features give you greater production efficiency . . .

1. New design provides low height to width ratio of spindles to ways.
2. Self contained hydraulic unit, separate from machine, for easy maintenance and elimination of heat problems.
3. Standard commercial hydraulic components throughout.
4. Nickel-iron, one piece ribbed base with integral fixture mounting pad and chip disposal basin.
5. Hardened and ground ways.
6. Conveniently located push-button control panel.
7. Forced feed lubrication.

FIND HOW THE 30-012 FITS YOUR REQUIREMENTS. WRITE FOR LITERATURE.



THE OLOFSSON CORPORATION

Lyons Ave., Lansing, Michigan

MANUFACTURERS OF PRECISION BORING MACHINERY AND SPECIAL MACHINERY

Barrel Finishing with EXOLON

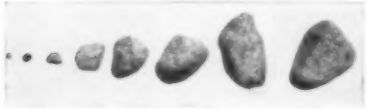
gives you control of stock removal

Replaces slow, costly, hand finishing methods

SAVINGS 50 to 80%

Precision parts shown above were barrel finished with EXOLON to a predetermined stock removal and finish. Results were always the same, batch after batch, because formulated finishing cycles were strictly adhered to.

Send us your problem parts. Our barrel finishing experts will be glad to help you. See coupon below for information required.



EXOLON Tumbling Abrasive is carefully graded in sizes from 2½ inches down to fine powders.

The following information is required whenever parts are sent to us for barrel finishing recommendations.

1. Send unfinished part and sample of part with desired finish.
2. Describe present finishing procedure.
3. List all special requirements.
4. Daily production required.

Name.....

Company Name.....

Address.....

The EXOLON Company
845 East Niagara Street, Tonawanda, N.Y.
Thorold, Ontario, Canada

mounted with a handle for use on lathe or turret lathe. Replaceable HSS blades are available from stock.

Universal Engineering Co, Frankenmuth, Mich

Die Lube Stick is used to fill in scratches or scoring left on the surface of the dies after grinding to remove metal pickup or galling. It is claimed that pickup is unlikely to occur again in the same area. Similar to a large crayon, it can be applied to the affected area without removing dies. It is said to be capable of withstanding extremely high temperatures, and is also reported to have excellent lubricating qualities.

Lubricants, Inc, 16170 James Couzens Highway, Detroit 21, Mich

Testmaster test indicators, Swiss-made, are available in L Series of eight models. Four have 0.0001-in. graduations with 0.032-in. range, and four have 0.0005-in. graduations with 0.060-in. range. They are furnished in both horizontal and perpendicular models. Two sizes of dials are available, one 1 in., the other 1½ in. Bulletin available .

Federal Products Corp, 1144 Eddy St, Providence, RI

Pre-set torque tool is available in a wide range of torque settings. One end fits the square drive of standard sockets, other end fits the square drive of any ratchet or other hand wrench. When threaded fastener being tightened has been drawn up to predetermined torque, release mechanism incorporatd in the tool permits 5 degrees free rotation which, when felt by the operator, is signal that max torque has been reached. Tool is available in ⅜ or ½-in. drive, and is individually calibrated. Specific torques from 100 in.-lb to 30 ft-lb may be furnished.

Milbar Corp, Cleveland, Ohio

"We want men between 25 and 35 with 40 years experience."

Milling cutters, inserted HSS blade straddle design, are offered for machining aluminum and light metal alloys. Double keyway design permits adjusting tooth position on paired cutters for processing different thicknesses of materials. Units are furnished with standard diameters from 4 to 16 in. and 1¼ to 2-in. arbor holes.

Goddard & Goddard Co, 12280 Burt Rd, Detroit 23, Mich

Safety glasses incorporate an eyewire with specially developed groove that not only holds lens securely, but is designed to support it against being driven backward toward eye when struck. Deeper lens groove gives maximum support of entire periphery; if lens should be broken by unusually severe impact, fragments are held together. The 2-Tone glasses are furnished in 3 eye sizes, 5 bridge sizes, 6 curve lenses.

American Optical Co, Southbridge, Mass

Roller bearing line in the 90,000 Series has been expanded to include hardened and ground alloy steel bearings in addition to the unhardened type. All are furnished with or without the split outer race.

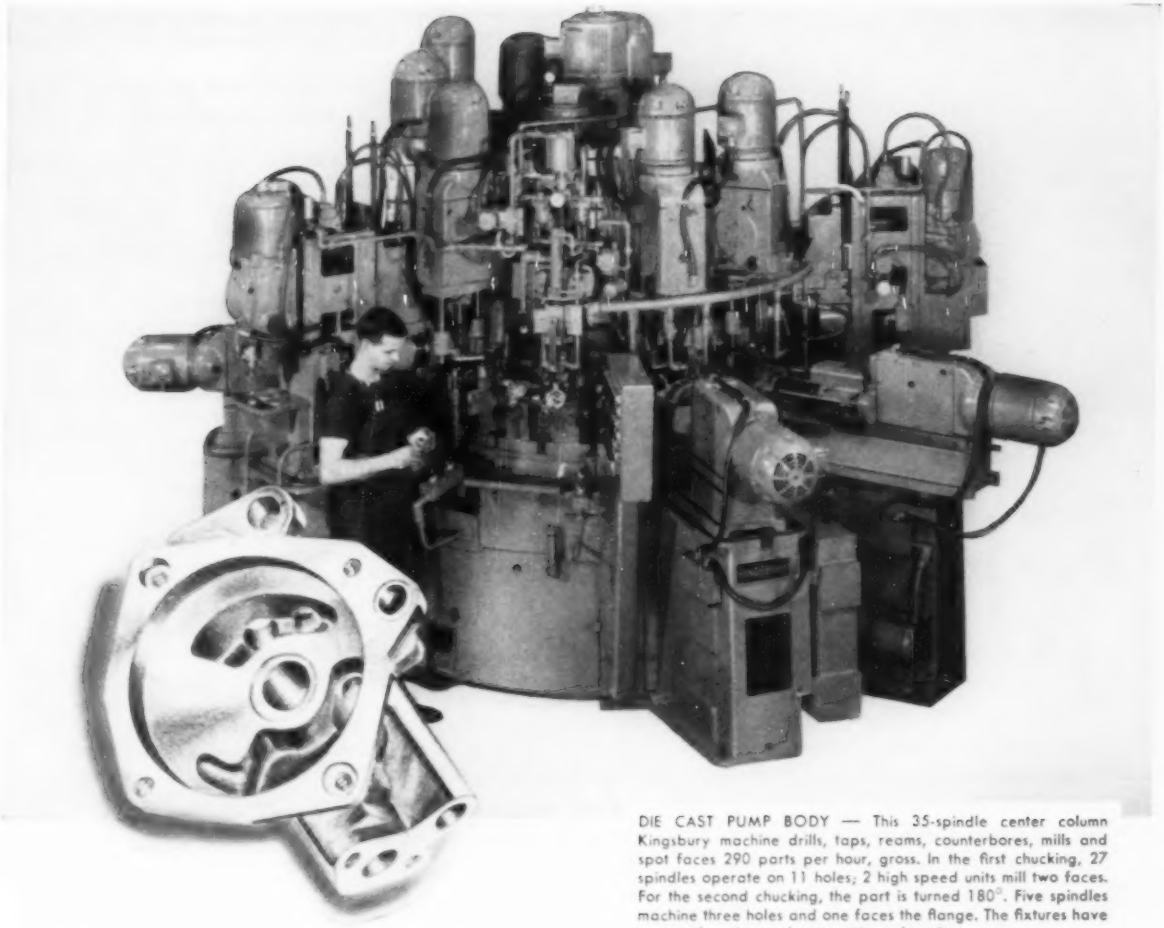
Corlett-Turner Co, 9145 King St, Franklin Park, Ill

Plastic tool clamp templets are available free, upon request. The set of three templets combined contain over 30 different figures.

PIC Design Corp, 477 Atlantic Ave, East Rockaway, LI, NY

Aluminum soldering flux may be used to join aluminum to itself or to other metals. Capillary action is so pronounced that it is reportedly possible to draw the solder between two pieces of aluminum even when held in a vertical position. Operating temperature is from 600 to 675 F. Residue may be removed with water.

American Solder & Flux Co, 19th & Willard Sts, Philadelphia 40, Penna



DIE CAST PUMP BODY — This 35-spindle center column Kingsbury machine drills, taps, reams, counterbores, mills and spot faces 290 parts per hour, gross. In the first chucking, 27 spindles operate on 11 holes; 2 high speed units mill two faces. For the second chucking, the part is turned 180°. Five spindles machine three holes and one faces the flange. The fixtures have power clamping and automatic unclamping.

More Good Parts Per Hour

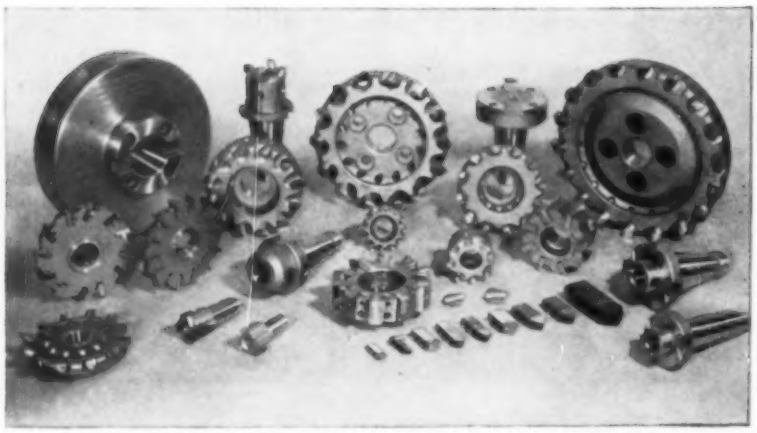
One indexing automatic is complex, the other fairly simple. Both produce good parts month after month at high production rates. The reasons are good basic design, rugged and accurate construction. This is true of every Kingsbury machine. To be sure the parts will meet your specifications, we run test samples for your approval before we ship the machine.

For 38 years, Kingsbury machines have been used for drilling and tapping operations on parts for the automotive, appliance, office machine, farm and industrial equipment and other industries. Let us quote on your jobs. Kingsbury Machine Tool Corporation, Keene, N.H.

RADIO PART — This Kingsbury performs nine operations on 560 parts per hour, gross. Three horizontal units with two-spindle auxiliary heads drill, countersink and tap two holes; three vertical units countersink, ream and burnish the axial hole.

KINGSBURY

INDEXING AUTOMATICS for high production drilling and tapping



Milling Cutters — End Mills — Blades — Boring Tools — Arbors — Flywheels

These Lovejoy Products can help you Cut Costs!

The entire line of Lovejoy Milling Cutters and Accessories is designed to aid you in getting better production at less cost.

If you are not now using Lovejoy products, we invite you to do so at first opportunity.

Lovejoy precision-engineered tools include:

Inserted-tooth milling cutters (face, side, end, slotting and boring) which feature husky, forged steel housings; exclusive Lovejoy "positive-locking" blade assembly; a variety of dozens of models and hundreds of sizes.

Blades: H.S.S., Vasco Supreme and carbide. These are interchangeable over a wide range of housing sizes, and Type "A" face milling blades will fit any standard Lovejoy Type "A" cutter of 4½" to 24" dia. All Lovejoy blades are carried in stock, ready for immediate shipment. Special cutters are a Lovejoy specialty.

PERFORMANCE REPORT

A Type H "SHEARJOY" cutter (with 35° lead angle) was used recently to reduce a 11,070 lb. casting to 3400 lbs. The cutter ran 18 straight hours without regrinding. Cutter condition after using was excellent. Owner's comment: "This is the cutter I've been looking for for a long time . . . if we had this cutter 10 years ago, we would have saved $50,000 . . . it's the most impressive cutter I have ever seen."

Catalogs — include: "Face Mill Catalog No. 31; Side Mill Catalog No. 32; Type "S" Bulletin; Arbor Catalog No. 33; "Speed and Feed" Calculator. Write today for copies desired.

LOVEJOY TOOL COMPANY, INC.
Springfield, Vermont, U.S.A.

FIELD REPORT...

Brown & Sharpe Mfg Co Expands Hydraulics Div

The hydraulic pump and fluid motor business of the Gerotor-May Co of Baltimore has been acquired by Brown & Sharpe and will be integrated into its expanding Hydraulics Division.

Double A Products Co, Manchester, Mich, manufacturer of hydraulic control valves, and the power unit portion of the Rosaen Co, Hazel Park, Mich, were recently purchased by B&S as part of the expansion program. New Gerotor line of pumps and fluid motors will be produced at the Manchester plant.

Chrysler Gets New Tank Order

The Newark, Del, defense plant will be working through 1959 on a new $65 million Army contract for production of 900 Patton medium tanks. Tanks will be built at the plant but parts will be supplied by subcontractors located in sections of the country termed critical labor surplus areas. Company is currently working on a previous government order (also 900 units) and work on the new contract is not expected to begin until next January.

Powder Metal Groups Organize To Broaden Application Field

Basic groups making up the industry have formed a new organization, Metal Powder Industries Federation, that succeeds the Metal Powder Association. Major purpose, according

"Clancy was all excited. He says the end of the rainbow was right outside the warehouse!"

to MPI's first president, Dr George Roberts, vice president of Vanadium-Alloys Steel Co, is "promoting new applications for metal powder parts on behalf of its members."

Group is made up of four trade associations: Metal Powder Producers, Ferrite Manufacturers, Metal Powder Core, and Powder Metallurgy Equipment Manufacturers. The newly set up American Powder Metallurgy Institute will coordinate research activities among the member companies.

Giddings & Lewis Buys Prescott Co

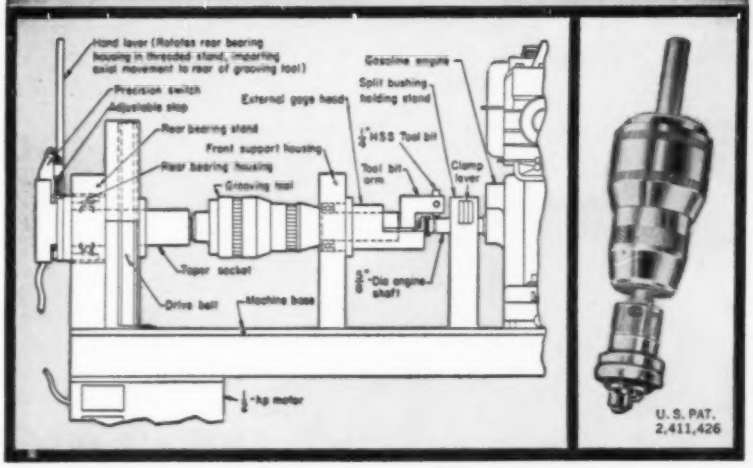
Giddings & Lewis Machine Tool Co, Fond du Lac, Wis, has purchased the land, buildings, and foundry equipment of the Prescott Co, Menominee, Mich. Prescott will continue manufacture of sawmill machinery and diesel engines, as well as contract work in the machine shop. Company closed its foundry operations April 30; G&L plans to start these operations in the near future. Foundry can produce gray iron castings up to 70,000 lbs.

Sperry Lets Subcontracts Totaling $14 Million

Sperry Gyroscope Co has placed orders with eight companies under the Air Force's recently disclosed electronic countermeasures (ECM) program for B-52 intercontinental bombers. Sperry, prime contractor, is managing the ECM program for the Air Force, and is working closely with Boeing Airplane, B-52 manufacturer, under the first USAF "associate contractor" contract assign-

"Ha! Intellectual snob!"

Groove cut in shaft of fully assembled engine with WALDES TRUARC GROOVING TOOL



To install a small gear, Clemson Bros. must machine a recess (Tolerance: +.033" —.000") in a shaft of the engine for their power lawn mowers.

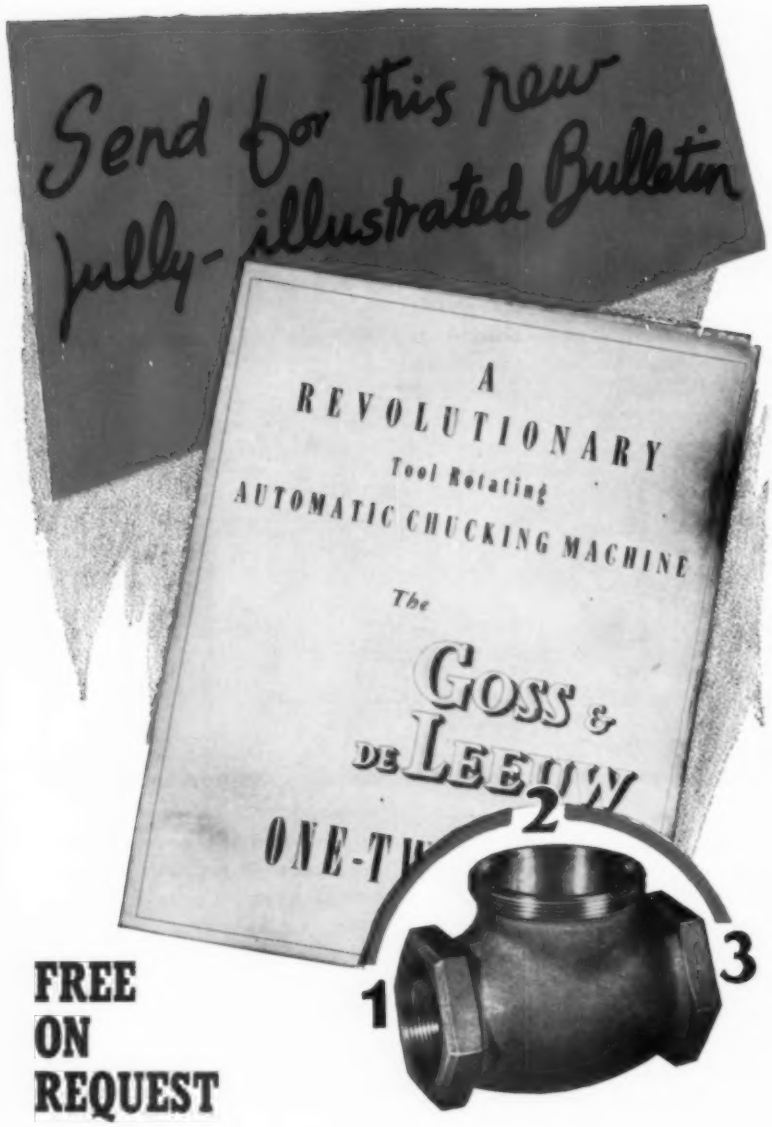
Engines arrive fully assembled. Normal procedure was to rotate the shaft. That involved removing a spark plug, mounting each engine firmly and accurately on a lathe, securing a gear or sprocket on the shaft, driving the shaft and moving the stationary cutting tool into position. The engine had to be reassembled after grooving.

All this costly time and labor was eliminated by holding the shaft stationary and *using a tool that rotates*—the Waldes Truarc Grooving Tool, equipped with an external grooving attachment. Because grooving dimensions are pre-set on the tool, there are no rejects caused by inaccurate cutting.

No recessing problem is too tough for this amazingly versatile tool. It's so simple, even unskilled labor can use it accurately...so cost-saving, it often pays for itself on a single small run!

Write now for 20-page manual containing full information on Waldes Truarc Grooving Tool.

WALDES
TRUARC®
GROOVING TOOL
WALDES KOHINOOR, INC.
47-16 AUSTEL PLACE, L. I. C. 1, N. Y. AM060



FREE ON REQUEST

Here are the answers to most of your questions as to what "ONE-TWO-THREE" means in describing this outstanding development of Automatic Chucking Machines by Goss and De Leeuw. You'll be interested not only in the revolutionary design of the machine itself, but also in its extraordinary performance—and how it is possible to handle from one to three operations—in sequence or simultaneously—without changing set up.

Get this interesting, informative Bulletin NOW—by merely asking for it.

GOSS and DELEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

Field Report . . .

ing system-manager responsibility in an avionic area. The electronic package for the plane is designed not only to jam enemy radars, but to outwit missiles as well.

Companies involved in the first round of subcontracts are Electronic Systems Division of Sylvania Electric Products; Federal Telecommunications Laboratories, Division of International Telephone & Telegraph Corp; Power Tube Dept of General Electric Co; Hallicrafters Co; Electronic Tube Division of Radio Corp of America; Farnsworth Electronic Co; Ryan Industries; and Eitel McCullough, Inc.

Snark Ready for Production

Northrop Aircraft reports that the Snark 5000-mile range ICBM is now ready for large scale production, and that Air Force go-ahead would result immediately in an additional 15,000 to 20,000 jobs in the Los Angeles area.

$4.5 Million Magnesium Plant . . .

. . . will be built at Selma, Ala, by Brooks & Perkins, Inc, Detroit. Company is making parts for the Navy's Vanguard missile, plans to start construction this summer.

American Society For Abrasives Plans Big Year Ahead

Expanded program approved and adopted by ASA for the coming year includes establishment of an annual national conference, publication of a monthly newsletter for members, and development of an information

"They're mothballed machinists. We keep them on hand in case anything goes wrong with automation."

People buy Scott Wipers for many reasons:

Mr. R. J. Stuart, Jr., Vice President, Messinger Bearings, Inc. says: "Scott Wipers meet our needs very well. We use them for many different wiping jobs, such as the wiping of finished bearings before inspection, wiping grease and dirt from turret lathes, keeping the hand wheel of a 144" boring mill clean plus all general clean-up wiping.

Messinger Bearings likes the safety and sanitation of Scott Wipers!

Messinger Bearings, Inc., Philadelphia makes precision bearings for the steel and machinery manufacturing industries, bearings for radar units, shipboard gun turrets, air force and army equipment. They've used Scott Wipers for the past two years. Mr. R. J. Stuart, Jr., Vice President, says: "There's a danger of metal chips in cloth wipers—chips that might cut an employee's skin, cause infection. We introduced Scott Wipers to eliminate this hazard, and to keep our men happy." Soft, absorbent two-ply paper Scott Wipers are always fresh from a box. They're disposable after use. At Messinger, Scott Wipers have helped improve morale, plant housekeeping and inspection work because the *uniformity* of Scott Wipers increases wiping efficiency.

Your Scott distributor has the complete Messinger Bearings case history and many others, covering many fields. He's in the Yellow Pages under "Paper Towels." Or write: Scott Paper Company, Dept. AM-86, Chester, Pennsylvania.

SCOTT PAPER

See "Father Knows Best" on NBC-TV.

3 ways CDT can help you

CDT CAN INCREASE YOUR PRODUCTION
. . . because CDT specializes in designing and building tools and machines for today's high production demands.

CDT CAN IMPROVE YOUR QUALITY
. . . because CDT tools, jigs, fixtures and machines are precision engineered and built to the strictest requirements.

CDT CAN LOWER YOUR PRODUCTION COSTS
. . . by increasing the efficiency of your operation with special tools that do the job better—faster—more economically.

Call on Columbus Die-Tool for your special tooling problems. A large creative engineering staff with experience in developing special tools and machines for hundreds of industries is at your service. Over 50,000 square feet filled with precision production equipment enables us to build fine tools and special purpose machines to exacting requirements. Avail yourself of the industry-wide experience of Columbus Die-Tool.

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ESTABLISHED 1906

Designers and manufacturers of JIGS • FIXTURES • SPECIAL TOOLS • UNITS FOR MACHINE TOOLS • *also Builders of Machine Tools Complete*

Field Report . . .

center and library. The Society also plans to establish industry awards and citations, sponsor research projects, and to set up a speakers bureau, film reference library, and a placement service.

Westinghouse Gets Order

Westinghouse Electric Corp has received an order of over $2 million from Todd Shipyards Corp, Seattle, Wash, to manufacture propulsion equipment for driving the Navy's guided missile destroyer DDG-14. Work will be done at the Westinghouse steam division in Lester, Penna. Destroyer launchings are scheduled for late 1959 and early 1960.

American MARC Inc . . .

. . . is starting immediate production of 2000 lightweight one and two-cylinder diesel engines at its Inglewood, Calif, facility. The $2 million Defense Dept contract is scheduled for completion in early 1959.

GE is Building in Phoenix

General Electric will spend $3 million for construction of a 104,000 sq-ft building that will be the first unit of a permanent plant for its computer division north of Phoenix, Ariz. Completion date is set for December. Start of construction coincides with a new GE program called Operation Upturn, designed to mo-

"Calling you on the carpet is the general manager's idea. Personally I enjoy your absenteeism."

Interstate Drop Forge Company—

20 Years a Cities Service Customer and Still Forging Ahead!

The modern way to cut a die is typified by die sinking machine, one of many at Interstate Drop Forge Company. All die sinking machines are lubricated by Cities Service lubricants.

With production running at roughly 1000 tons per month, Interstate Drop Forge Company of Milwaukee is one of the largest forging concerns in the Wisconsin area and growing all the time.

An integral part of this growth story, Cities Service is proud to have filled Interstate's lubrication needs for the past 20 years.

Drop hammers . . . helve hammers . . . upsetters . . . forging rolls . . . shapers . . . automatic metal saws. These are but a few of the diversified machines lubricated by specially tailored Cities Service oils and greases.

Actually, in a plant of this type with so many differing pieces of machinery, it would be possible to have as many as 25 different lubricants. But, Interstate, with the aid of their Cities Service Lubrication Engineer has been able to standardize on twelve Cities Service lubricants.

Streamlining . . . standardizing . . . improving. These are some of the services a Cities Service Lubrication Engineer can render for your operation, too. Ask him to make a free lubrication survey of your plant. Call the nearest Cities Service office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

"POP"® RIVETS

can probably save you money . . .

Even if your present fasteners are free!

Greater Design Flexibility
No need for access to both sides.

High Clinching Action
Exerts as high as 600 pounds squeeze between parts.

Wide Grip Range
Same length "POP" Rivet holds tight through thick or thin.

Vibration Proof
"POP" Rivets cannot back out or become loose. No lock washers or nuts required.

Low Head Profile
Where space is important, "POP" Rivets' minimum head height is the answer.

Less Critical Hole Diameter
Designer wants holes tight, production wants holes larger. "POP" Rivets make both happy.

Least Back-Up Space
Strong, high grip "POP" Rivets need only enough back-up space to provide room for set head.

When buying fasteners, do you figure the *installed costs?* A fastener considered alone may cost very little but be very expensive by the time it's installed and becomes part of a finished product.

"POP" Rivets afford greater flexibility in product design. Often operations can be eliminated, assembly costs reduced, and speed of fastening increased.

Many users find high strength "POP" Rivets the most efficient and economical fastener for their product. Investigate its use in your application. Perhaps you too can enjoy the many advantages "POP" Rivets have to offer. Write us today.

"POP" RIVET DIVISION

UNITED SHOE MACHINERY CORPORATION
West Medway, Mass.

Field Report . . .

bilize all personnel and facilities in a six-month drive to increase business.

Hall-Scott Engine Division Acquired by Hercules Motors

Purchase, for an undisclosed amount, of the Berkeley, Calif, Division includes all inventory, certain machinery, tools and engineering data, along with use of the Hall-Scott name. Hercules plans to build H-S engines in its Canton, Ohio, plant. Acquisition complements company's present line of liquid and air-cooled gasoline and diesel units and makes available a horsepower range of from 5 to 600 hp.

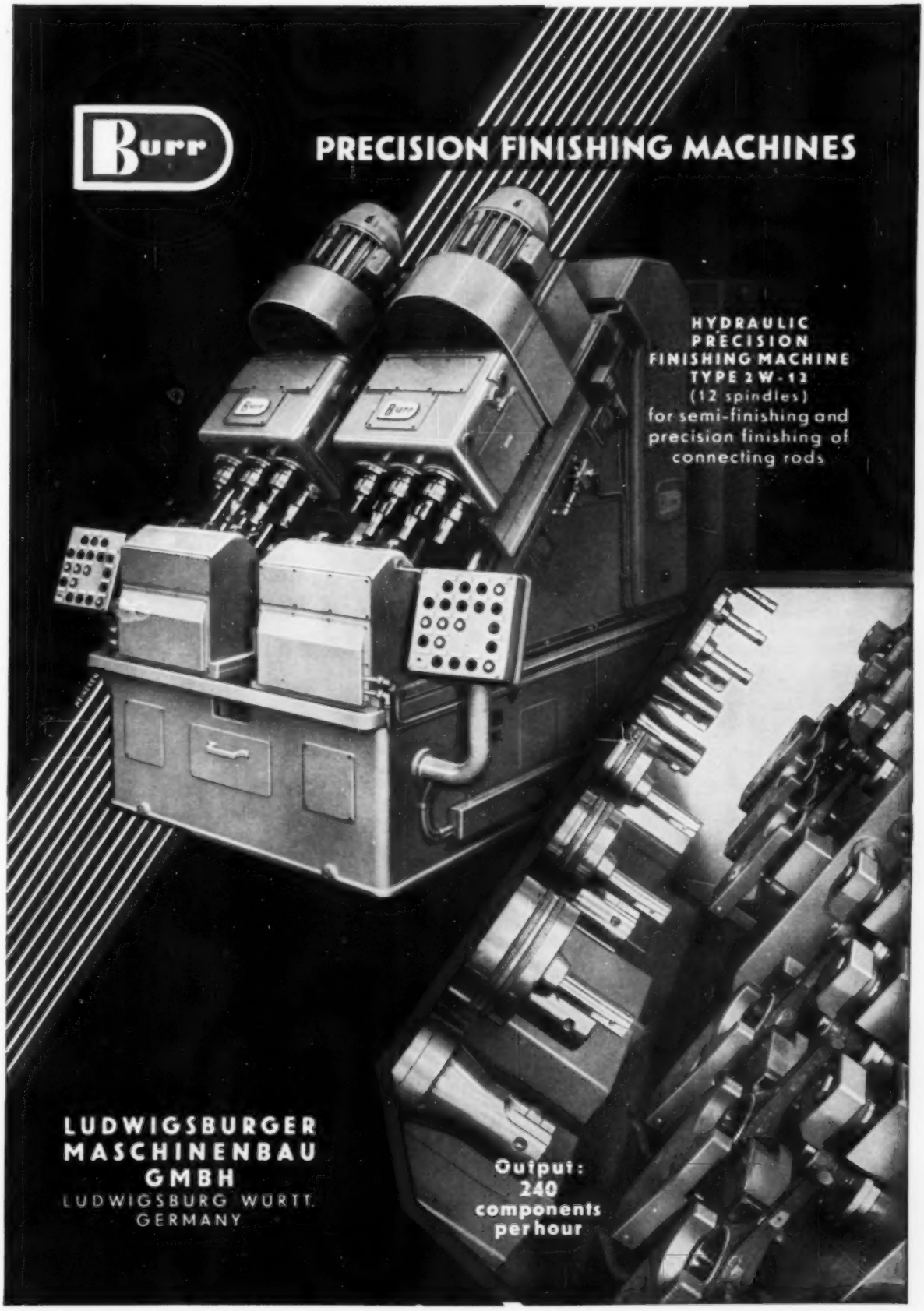
Lockheed's Missile Systems Div Expects Employment Boost

Employment at the Division's Van Nuys, Calif, plant is expected to be upped more than 15% this year because of expansion of current and planned projects. Facility, which presently employs 3000, is handling development and manufacture of the AF X-7 supersonic ramjet test missile, the Q-5 target missile, and several highly classified programs.

Napco Industries Order

The Minneapolis subsidiary of Beryllium Corp has a $10 million contract from Curtiss-Wright Corp to turn out 15,000 driving axle assemblies and other undergear parts. Contract is part of a $40.8 million order to C-W for 5000 military tactical tank trucks.

"Don't let it worry you that you don't appear to be getting anywhere in the firm, Binko—we don't expect all our employees to."


Burr
PRECISION FINISHING MACHINES
HYDRAULIC PRECISION FINISHING MACHINE TYPE 2W-12
(12 spindles)
for semi-finishing and precision finishing of connecting rods
LUDWIGSBURGER MASCHINENBAU GMBH
LUDWIGSBURG WÜRTT.
GERMANY
Output: 240 components per hour

This Rodgers Platen Press Draws

800 STEEL HOUSINGS A DAY

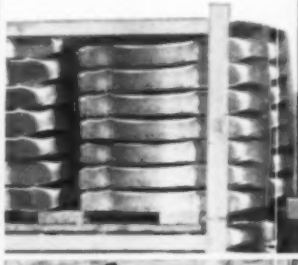
for Foley Power Mowers

Designing a light power mower to give heavy duty service and at the same time sell for an economy price takes a lot of engineering and production efficiency. The Foley TARTAN, with a cold-rolled steel housing formed on a Rodgers Platen Press, is the answer of Foley Manufacturing Co. to this problem.

The Rodgers 400-ton Platen Press handles three operations on the Foley lawn mower housings. First, it blanks the flat stock to the proper 27½" x 28⅞" shape. Second, it makes the draw as shown in the photo. Third, it pierces all the holes and final trims ready for assembly.

A fast approach and return of the platen makes it possible to draw the 14 gauge cold-rolled steel blank at a production rate of 100 an hour. Working at 190 tons pressure, the machine makes a smooth draw on a pneumatic die cushion. Accurate clamping pressure over a 48" x 60" platen provides smooth, even forming and extra capacity when needed.

If you have an operation requiring a platen press, write for bulletins on Rodgers Platen Presses from 50 to 500 tons.



1 **Rodgers Platen Press** turns out 100 lawn mower housings per hour of 14 gauge cold-rolled steel at the Foley Manufacturing Co. plant.

2 This is the Foley TARTAN, an economy 1¾ HP rotary lawn mower with a heavy duty steel housing blanked, drawn and pierced on a Rodgers 400 ton platen press.

3 Both of the operator's hands are required on controls during the drawing operation—a safety factor.

HYDRAULICS Rodgers KEEP THE WORLD MOVING

Rodgers Hydraulic Inc.

7407 Walker St., Minneapolis 26, Minn.

Warren C Olson, executive vice president of Besly-Welles Corp, has been elected president and chief administrative officer. He succeeds **Edward K Welles,** named board chairman and chief executive officer

Oscar A Ahlers, senior vice president of the Sheffield Corp, has been named, in addition, general manager of the firm with over-all supervision of sales, product divisions, and field service manufacturing facilities

Stanley E Huffman, Jr, has joined E W Bliss Co as sales manager of the Press Division. He was formerly district manager of Pratt & Whitney Co's Rochester office

NAMES IN THE NEWS...

Joseph A Anderson, general manager of AC Spark Plug Division, Flint, Mich, has been elected a vice president of General Motors. He will continue in charge of AC.

John A McGuire, vice president of Thor Power Tool Co, Chicago, has been elected an executive vice president of the company.

Kenneth D Johnson has been named vice president, manufacturing, of the Carter Carburetor Division of ACF Industries, St Louis. He was formerly operations manager for Trailmobile, Inc.

Willard Sweetman, Jr, has been named manager of the Pacoima, Calif, plant of Sundstrand Machine Tool Co's Sundstrand Turbo Division. He was assistant general manager there when it was operated as the Turbo Division of American Machine & Foundry Co.

G W Brown, vice president in charge of engineering and research, Wagner Electric Corp, Saint Louis, has been elected executive vice president of the company. **Paul C Ford,** executive engineer, has been elected to Mr Brown's former post, and **R H Hackett,** general superintendent of the manufacturing department, has been named vice president, manufacturing.

Edward C Helmke, assistant chief engineer of Gisholt Machine Co, Madison, Wis, has been appointed chief engineer.

Alan F Kelsey has joined Marchant Calculators, Inc, Oakland, Calif, as director of manufacturing. He previously held a similar post at Magna Power Tool Corp, Berkeley. **John E Wilson** has been appointed plant manager of Marchant's new Oakland factory; he was formerly general superintendent, manufacturing.

K H Hobbie, sales manager of Driver-Harris Co, Harrison, NJ, maker of resistance wire and alloys, has been elected vice president and a member of the board. **W Paul Smith,** assistant sales manager, has been named an assistant vice president, as has **E J Davies** who will now be in charge of manufacturing.

Albert J Wilhelm, vice president, manufacturing, and one of the founders of Clearing Machine Corp, Division of US Industries, Inc, has retired after 25 years as production head of the company

R H Timmons has been appointed manufacturing manager of the Gearing Division of Westinghouse Electric Corp. He has been serving as works manager of the Steam Division at South Philadelphia.

Robert F Gladfelter, sales vice president of Detroit Power Screwdriver Co, subsidiary of Link-Belt Co, has been elected president to succeed **Roy W Bailey,** one of the founders of the firm, who has retired. **John M Small,** plant superintendent, has been named vice president.

Harry H Wetzel has been appointed manager of Garrett Corp's AiResearch Manufacturing Division, Los Angeles. He succeeds **Claude N Monson,** named vice president in charge of contract administration. Mr Wetzel, previously manager of the AiResearch Industrial Division, has been succeeded there by **Wilton E Parker,** formerly sales manager and chief engineer.

OBITUARY

Alexander S Keller, 53, vice president and general sales manager of Pratt & Whitney Co, Inc, West Hartford, Conn, died May 16. Recognized as an authority on machine tool design, Mr Keller was chairman of the foreign sales committee of the National Machine Tool Builders' Association. He served on the advisory committee of the War Production Board, the machine tool advisory committee of the Department of Commerce, and the advisory committee on tool operations of the National Production Authority. He was a former president of the Lamb Electric Co, Kent, Ohio.

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THE TECHNIQUE

For lowest cost per unit processed they're both

Anderson

Write for complete catalog of wire brushes, with detailed selection and operation data.

Anderson

ANDERSON CORPORATION

1056 Southbridge Street Worcester, Mass.

NAMES IN THE NEWS...

James R Garner has joined Waste King Corp, Los Angeles, as chief manufacturing engineer of its Technical Products Division. He was formerly chief production engineer for the Clary Dynamics Division of Clary Corp, San Gabriel, Calif, designer and manufacturer of guided missile components.

Thomas C Petty has been elected president of Hauck Manufacturing Co, Brooklyn, NY, manufacturer of gas and oil burners and allied heating equipment. **Mrs M E C Gerdes,** former president, has been named board chairman. **William H Oler,** previously general sales manager of the industrial division, has been named vice president of the company.

Leonard M Kulze, chief engineer of Associated Spring Corp's Gibson Division, Chicago, has been promoted to factory manager. **Joseph A Harinek,** plant engineer, succeeds Mr Kulze.

Wilson Bradley, Jr has been appointed vice president and general manager of the Endevco Corp, Pasadena, Calif, electronic instrumentation manufacturer. He will continue his activities in the design and development of new electronic components.

Robert F Norris has been appointed manager in charge of Denison Engineering Division's Delaware, Ohio, plant. Denison is a division of American Brake Shoe Co. Mr Norris had been superintendent of the Columbus plant. **Carl W Lindahl,** director of purchasing, has been named works manager in charge of all manufacturing activities at the Columbus plant. **George T Hays,** purchasing agent, succeeds Mr Lindahl.

K H Hunt, superintendent of Air Reduction's new Chicago liquid oxygen, nitrogen, and argon plant, has been appointed works manager to succeed **W F Grotevent** who has been transferred to the eastern region to manage a similar plant now being completed near Boston.

C J Baumgart, president of Screw Machine Engineering Co, Chicago, has been elected president of the National Screw Machine Products Association. **Leonard R Schaffer,** president, Mechanical Art Works, Inc, Newark, NJ, is new vice president.

Stanley C Pace, assistant manager of Thompson Products' newly formed Tapco Group, has been elected a vice president of the company.

Edward T Doyle, formerly manager of the Tracer Division of Lehigh, Inc, has been appointed sales manager of the Tool Division of General Machine Co, Emmaus, Penna.

John E Puvogel, manager of manufacturing of Hoskins Manufacturing Co, Detroit producer of thermo-electric and special purpose alloys, has been appointed vice president, manufacturing.

R E Persohn has been promoted from assistant general manager to manager of Allis-Chalmers Gadsden, Ala, Works. He succeeds **S W Ouweneel,** who has been made assistant to the general works manager, Tractor Group, in Milwaukee.

Lewis A Curtis, vice president, sales, of Package Machinery Co, East Longmeadow, Mass, has been elected president. **Roger L Putnam, Jr,** vice president, manufacturing, has been made executive vice president.

Francis J Dunleavy has been promoted from assistant general manager to manager of the Philadelphia plant of Yale Materials Handling Division of Yale & Towne Manufacturing Co.

Richard M Stewart has been elected president of American Brass Co. Formerly director of industrial relations of Anaconda Co (parent company), he succeeds **John A Coe** who will continue as the company's chief executive officer, in addition to serving as board chairman.

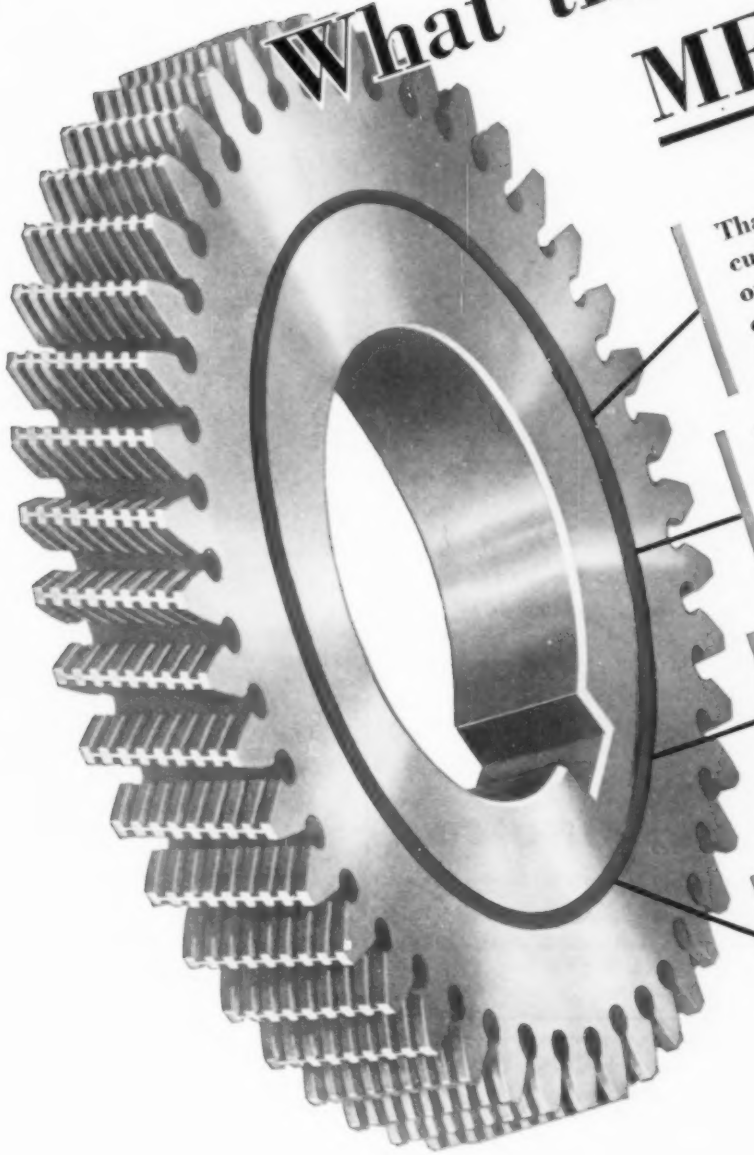
John P Rubie has been named manager, materials, of General Electric Co's Magnetic Materials Section, Edmore, Mich. He was formerly manager of materials in the welding department, York, Penna.

John A Backstrom has been appointed general manager of Palmer Tool & Forging Co, Meadville, Penna. He was formerly works manager of the Enterprise Co, subsidiary of Wm K Stamets Co, Columbiana, Ohio.

John E Potter, secretary and treasurer of Tinnerman Products, Inc, Cleveland fastener manufacturer, has been elected vice president and treasurer.

Edwin B James, general sales manager of McKay Machine Co, Youngstown, Ohio, has been named vice president, sales.

What that Red Ring MEANS



That Red Ring on a gear shaving cutter means it was made by an organization which has more experience and success in this field than any other in the world.

That Red Ring marks the product of engineers and shop men who devote all their working time to these CUTTERS — nothing else.

That Red Ring reminds the user that these specialists are ready to help him get off the hook if he runs into a troublesome gear problem.

That Red Ring says "This cutter is designed and manufactured to deliver the best possible shaving performance."

Write for bulletin CR 56-10

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ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

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SAME DAY Shipments — Standard ABC drill jig bushings from our FACTORY and conveniently located WAREHOUSING DISTRIBUTORS.

SPECIAL sizes get top priority SERVICE.

CAREFUL manufacture — from WEAR-RESISTANT, chrome alloy bearing steel.

ABC drill jig bushings meet the most rigid standards of PRECISION and DURABILITY.

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RANDALL and STICKNEY
Dial Gauges and Indicators

are accurate, reliable and built to stand hard usage.

Model "C 50 B" has a 2¼" overall diameter, balanced dial 0-25-0 with .0005" graduations, ½" range and movable dial easily set at zero.

The cases on all R. & S. Gauges are made from sturdy castings. The case and plate are two separate units so that repairs can be made easily.

This style instrument can be furnished with various dials, graduations and ranges, in both English and Metric. There is an R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

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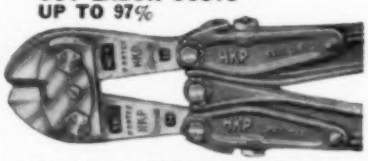
Here's the Curtain-Raiser to a Quick Solution!

HKP PORTER CUTTERS

There's a HAND or HYDRAULIC powered PORTER CUTTER to answer your toughest metal-cutting problems — over 100 different cutters, all designed to save you time, labor, and money! Make short work of cutting:

• Bolts • Rods • Screws • Rivets • Wire • Chain • Steel Strapping • Soft, Medium & Hard Metals & Many Others

CUT LABOR COSTS UP TO 97%



The famous PORTER CENTER-CUT CUTTER . . . our most popular tool . . . is the leading all-around cutter for industrial use! For Free Cutting of Soft and Medium Hard Metals up to ¾". Available in 6 sizes.

. . . and for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER can increase one man's output up to 300% in continuous volume cutting! In 3 sizes — up to ½" capacity!

ALSO . . . for those RUGGED JOBS!

The PORTER HEAVY DUTY CUTTER cuts almost anything in metal up to ¾" diameter — thanks to its heat-treated, hard-tempered center-cut jaws! Comes in 3 sizes.

Contact your Industrial Distributor . . . or write for your free catalog with illustrated, detailed descriptions of the versatile PORTER line!

CUT up to ¾" rods with **HAND OPERATED TOOLS** — up to 1⅜" rods and 2½" power cable with **POWER OPERATED TOOLS.**

H. K. PORTER, inc.
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VASCOJET 1000

The ultra high strength steel

having highest strength-to-weight ratio at temperatures to 1000° F

VASCOJET 1000 is now in wide use by the aviation and missile industries for ultra high strength structural requirements over the temperature range from −100° to +1000°F, and in the transportation and other fields where exceptionally high tensile strength and toughness are desirable.

Today, VascoJet 1000 is supplied in a wide range of shapes and sizes: squares and flats up to 256 square inches of cross section, in sizes such as 16″ square or 28″ x 8″ with guaranteed center properties; all standard bar sizes; sheet and plate from .025″ up to ½″ thick, in standard widths up to 78″ and in lengths up to 180″; solid disc and ring forgings; all rod and wire sizes.

VascoJet 1000 is easily machined, deep drawn, stamped, spun, extruded, cold headed or hot forged. It is readily welded with full properties retained. Write us for Specification Sheets showing guaranteed properties of this remarkable steel.

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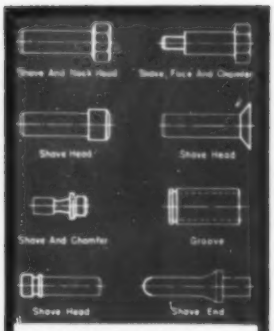
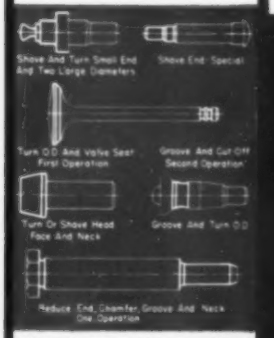


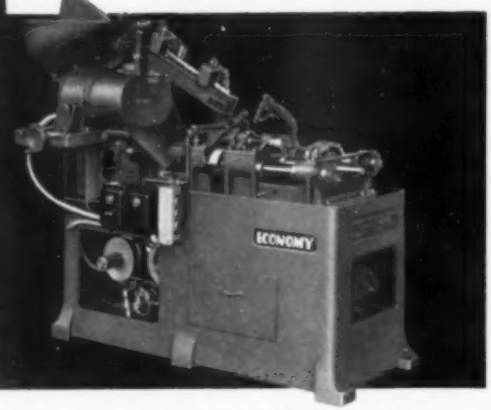
Typical parts machined on the "LS"-3600


Shave And Turn Small End And Two Large Diameters
Shave End Special
Turn O.D. And Valve Seat First Operation
Groove And Cut-Off Second Operation
Turn Or Shave Head Face And Neck
Groove And Turn O.D.
Reduce End, Chamfer, Groove And Neck One Operation

Illustrating operations completed on the S-4300

Face, Turn, Groove, Neck, Cut-off and Burnish BOLTS, AUTOMOTIVE VALVES, PROJECTILES & SIMILAR PARTS *Automatically at High Production Rates on* ECONOMY

Automatic Shaving Machines



ECONOMY Automatic Shaving Machines are available in two sizes — the "LS"-3600 for body diameters up to ½" and lengths under heads from ½" through 4½" — the S-4300 for body diameters up to 1" and lengths ¾" to 6" under heads. Production rates for the standard "LS"-3600 range from 800 to 2400 finished parts per hour and the S-4300 from 450 to 1800 per hour.

Machines are fully automatic and parts flow from hopper to work pan. Simple adjustments plus easy, rapid set-ups enable operator to operate several machines.

For the ultimate in accuracy, high production and low costs investigate ECONOMY Automatic Shaving Machines.

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Automatic Pointing & Shaving Machines
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Double End Automatic Pointing Machines
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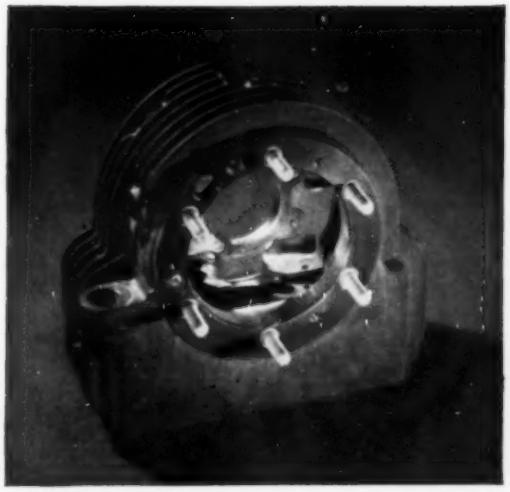
Proven in use by leading manufacturers, PLASTIC STEEL can cut costs, speed production in *your* plant. 1001 uses in industry — write for your copy today. FREE catalogue on request.

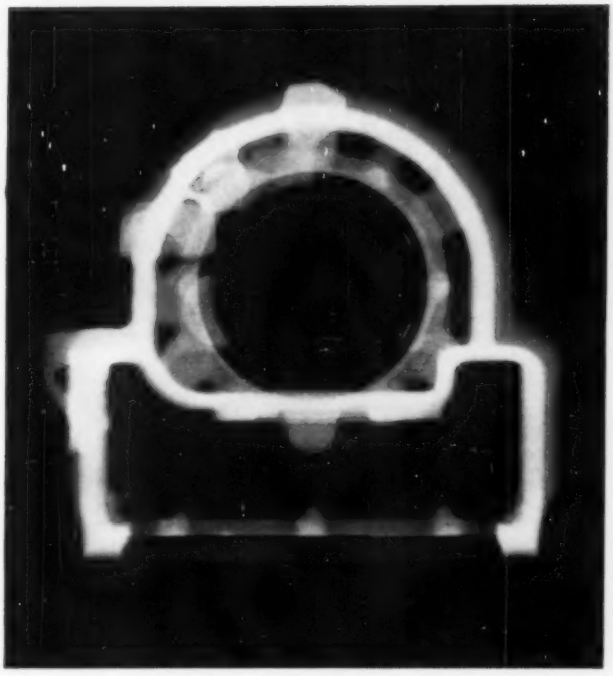
Nationally distributed by leading Industrial Suppliers.

DEVCON CORPORATION
16 Endicott Street, Danvers, Mass.



Shrink caused leakage...

Radiography showed how to correct it



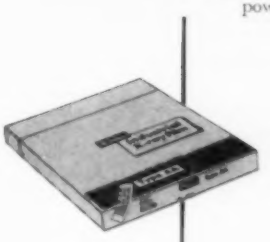
Radiograph of rough casting for air turbine-driven power supply gear housing.

This casting is the gear housing of a vital air turbine-driven power supply produced for the Utica Division of Bendix Aviation Corp. for use in jet-age aircraft. It must operate at temperatures up to 300°F with utmost dependability.

Seepage of oil through the shell was a recurring problem. And this is where radiography came in with a double-barreled assist. First, radiographic examination of the rough castings provided information to help determine whether the castings would prove acceptable when machined — *before* more than 150 machining operations were performed. Second, the radiographs revealed the cause of the difficulty — internal shrinkage — and disclosed a recurring pattern which led to placing chills so as to overcome it.

Result: a critical part became a routine production item with substantial savings in time and costs to both foundry and manufacturer.

If you would like to know how radiography can improve your own operations, talk it over with your x-ray dealer—or the Kodak technical representative.



The new Kodak Industrial X-ray Film, Type AA, gives you these advantages

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under the usual shop conditions of use.

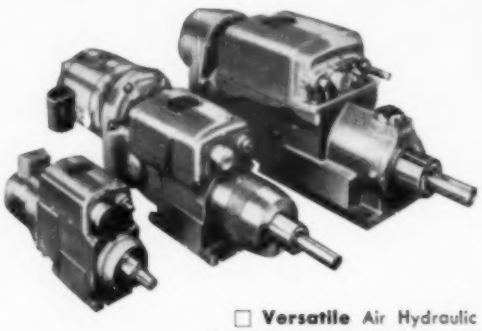
Kodak Industrial X-ray Film, Type AA, is now available with or without interleaving paper, as you may desire.

EASTMAN KODAK COMPANY
X-ray Division · Rochester 4, N. Y.

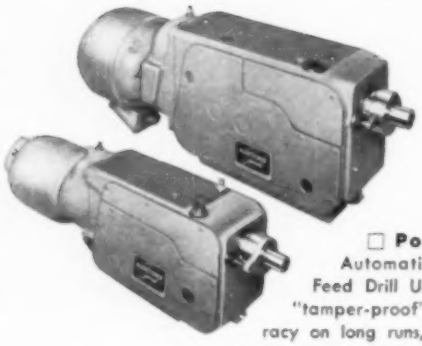
Kodak
TRADE MARK

YOU

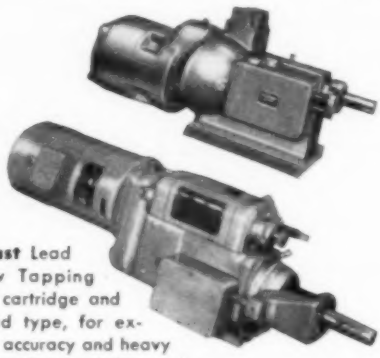
CAN CUT PRODUCT COSTS WITH HARTFORD POWER UNITS



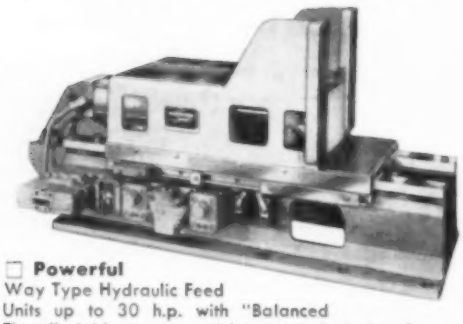
☐ **Versatile** Air Hydraulic Drill Units for quick change of set-ups, rapid operation.



☐ **Positive** Automatic Cam Feed Drill Units for "tamper-proof" accuracy on long runs, faster cycling, lower cost per piece.



☐ **Fast** Lead Screw Tapping Units, cartridge and geared type, for extreme accuracy and heavy duty multiple spindle work.



☐ **Powerful** Way Type Hydraulic Feed Units up to 30 h.p. with "Balanced Thrust", rigid accuracy, quick traverse, long travel on hardened ways for high production, multiple spindle work.

Remember, too, you can keep your tooling cost low by using Hartford "off-the-shelf" machine components — bases, columns and adapters.

☑ Check the type that will reduce **your** manufacturing costs. Write today for full information and name of our nearest field man — a specialist in low cost production techniques.

THE HARTFORD SPECIAL MACHINERY COMPANY
MACHINE TOOL DIVISION
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HARTFORD *Special*

R B&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Technical-ities

By John S. Davey

Selecting the right grade of nuts

"Workhorse" among nuts is the standard "FINISHED" series. It gives good seating area; sufficient height to sustain high thread tension; enough wall thickness to control elastic nut dilation under load.

"HEAVY" nuts are wider than "Finished" nuts in *all* sizes by only ⅛" across flats. Thus, their value diminishes as size increases. Most effective in ½" to 1½" range, they satisfy applications involving excessive clearance holes, unusual loads, and certain boiler codes.

MATERIALS? The regular carbon nut steel (non heat treated). It makes nuts strong enough to pull bolts beyond yield point, lets threads distribute load to avoid stripping.

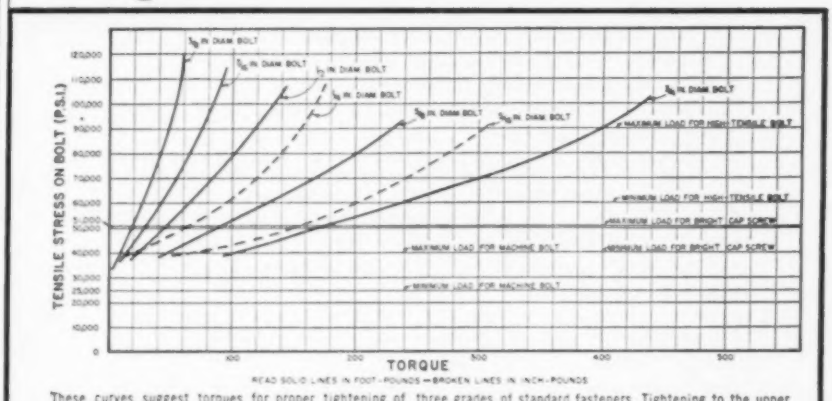
NUTS WITH "SPECIAL" FUNCTION

JAM NUTS are made for position locking. Use of two together forms a superior and economical locking device. When used to lock a regular nut, jam nut should be adjacent to work surface. Otherwise, the jam nut takes the load — a job it wasn't designed for.

Use a 2H NUT where high temperatures call for stability.

HIGH NUTS are used for shackle, U and tractor pad bolts. They're furnished only in fine threads, therefore, and hardened. More to be recommended are *coarse thread* finished nuts.

Tightening up fasteners tightens down on costs


TENSILE STRESS ON BOLT (P.S.I.)
TORQUE
MAXIMUM LOAD FOR HIGH-TENSILE BOLT
MINIMUM LOAD FOR HIGH-TENSILE BOLT
MAXIMUM LOAD FOR BRIGHT CAP SCREW
MINIMUM LOAD FOR BRIGHT CAP SCREW
MAXIMUM LOAD FOR MACHINE BOLT
MINIMUM LOAD FOR MACHINE BOLT
READ SOLID LINES IN FOOT-POUNDS—BROKEN LINES IN INCH-POUNDS

These curves suggest torques for proper tightening of three grades of standard fasteners. Tightening to the upper limits delivers more of the holding power paid for, and assures stronger joints. Dropping below minimum values wastes fastener strength, invites loosening and failures. These curves are reproduced in RB&W Booklet DC-1.

It pays to go the limit in tightening bolts. Not only is it more economical, but safer too. For strength of a rigid connection depends on *residual tension* rather than on how strong the bolts are. Applying this fact can help avoid cost penalty.

EXAMPLE:

Blueprint specifies alloy bolts with strength of 145,000 psi. But assembly specification calls for tightening to what has been found an adequate pre-loading . . . only 30,000 psi. This wastes the fastener's capacity. It provides no more joint-strength than supplied by a *far more economical* RB&W bright cap screw tightened to same pre-load. It would be better to switch to the lower grade, or reduce size of the premium grade fastener.

REDUCING SIZE ALSO SAVES

A fastener's holding power is the same as its pre-load, or residual tension. So long as it permits tightening to the required pre-loading, the bolt can be small as possible.

EXAMPLE:

Design requires fasteners with safe load capacity of 20,000 lbs. Bright cap screws of ¾" size will do it; but so will ⅝" RB&W High Strength Bolts — *at less cost*. Actually, for the same holding power as in $1.00 worth of high tensile fasteners, $1.50 worth of bright cap screws are required.

PRODUCTION BENEFITS

Along with direct savings, smaller bolts mean smaller holes to drill or tap. Smaller holes often allow reduction in size of fastened members.

Talk to an RB&W fastener expert at the design stage of your product. He can help you cut costs without cutting joint strength.

Meanwhile, send for helpful booklet DC-1. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

WILSON "ROCKWELL"

HARDNESS TESTERS

WORLD'S STANDARD OF ACCURACY

ACCO for Better Values

EQUIPMENT for EVERY Hardness Testing Requirement

No matter what your hardness testing requirements are, there's a WILSON "ROCKWELL" instrument to do the job. Choose from this complete selection of hardness testers:

"ROCKWELL"—for most hardness testing functions.

Superficial—for extremely shallow indentations.

Twintester—combines functions of "ROCKWELL" and "ROCKWELL" Superficial testers.

Semi-Automatic (manual feed) and Fully Automatic—for automatically classifying tested pieces as CORRECT, TOO HARD, or TOO SOFT—at test rates up to 1000 pieces per hour.

Special Machines—for testing large objects, obtaining internal readings, and other unusual applications.

ALL WILSON "ROCKWELL" hardness testers provide these advantages:

Accurate performance—precision built, with exact calibration, for consistently correct results.

Long life—durable as a machine tool.

Easy operation—even an unskilled operator can get perfect readings. All controls conveniently grouped.

Easy maintenance—interchangeable mechanisms, with spindles mounted on oil-less bearings.

DIAMOND "BRALE" PENETRATORS
for perfect testing every time

A perfect diamond penetrator is essential to accurate hardness testing. Since one point of hardness on the "ROCKWELL" scale represents only 80 millionths of an inch of penetration—only 40 millionths on a Superficial tester—the slightest imperfection will cause a false reading.

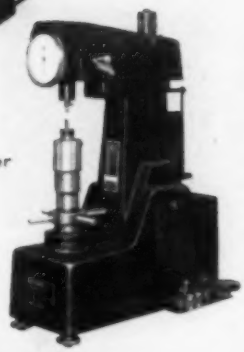
Only *perfect* Wilson Diamond Brale Penetrators are sold. Each diamond is flawless, with no chips or cracks. It's cut to an exact shape. Microscopic inspection and a comparator check of every diamond—one at a time—assure this perfection—and assure you of accurate hardness testing every time.

A COMPLETE LIBRARY of Helpful Information

A wide variety of bulletins tells about hardness testing, and describes the many instruments, accessories, and services Wilson offers. Write for your choice:

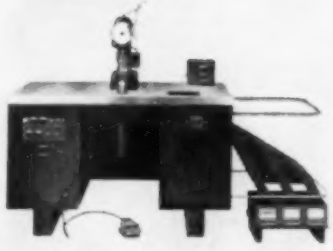
DH-325—WILSON "ROCKWELL" Hardness Testers • **DH-326**—"ROCKWELL" Superficial Hardness Testers • **TT-58**—"ROCKWELL" Twintester • **DH-327**—Special "ROCKWELL" Testers, including Automatic and Semi-Automatic models • **DH-328**—TUKON Tester, for precision MICRO and MACRO testing

"ROCKWELL"



Twintester

Superficial



Automatic

TUKON Tester (for MICRO and MACRO testing)

ACCO **WILSON**

MECHANICAL INSTRUMENT DIVISION

AMERICAN CHAIN & CABLE

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WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
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- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
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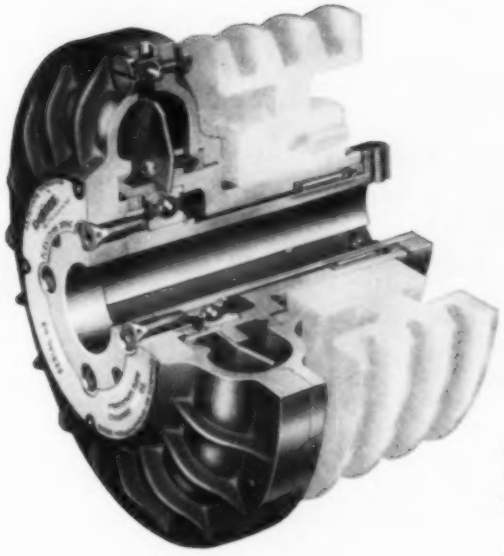
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 100 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS

The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

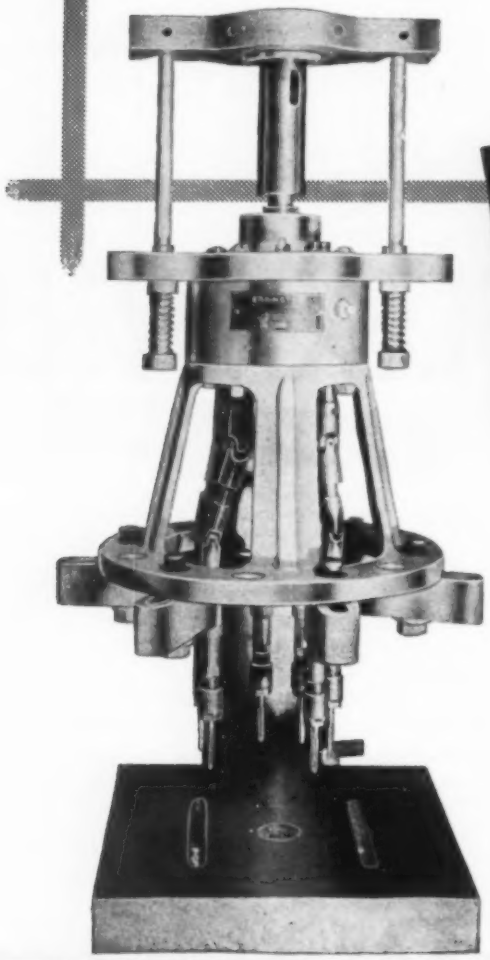
DODGE

of Mishawaka, Ind.

ERRINGTON

UNIVERSAL JOINT ADJUSTABLE TAPPING & DRILLING HEAD

Here's another hi-speed production tool from Errington. This dependable tool is adjustable to any pattern of holes . . . is available with 4 or 6 spindles. Positive clutch drive and reverse. Head made of the best grade sand Cast Aluminum with hardened and ground gears and spindles (made in one piece). Full grooved ball thrust bearings at all thrust points and Oilite bronze radial bearings. *Remember to do more . . . better . . . faster* . . . rely on Errington Hi-Speed Production Tools.



LESS THAN ½ MINUTE TO CHANGE HEAD FROM DRILLING TO TAPPING OR TAPPING TO DRILLING

#0—0" to ¼" Tap Capacity
Min. centers 11/16"
Max. Pattern 5¼"

#1—7/32" to ⅜" Tap Capacity
Min. centers 1½"
Max. Pattern 8"

Send For Complete Information

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Established 1891
Main Office and Plant: **STATEN ISLAND 4, N. Y.**
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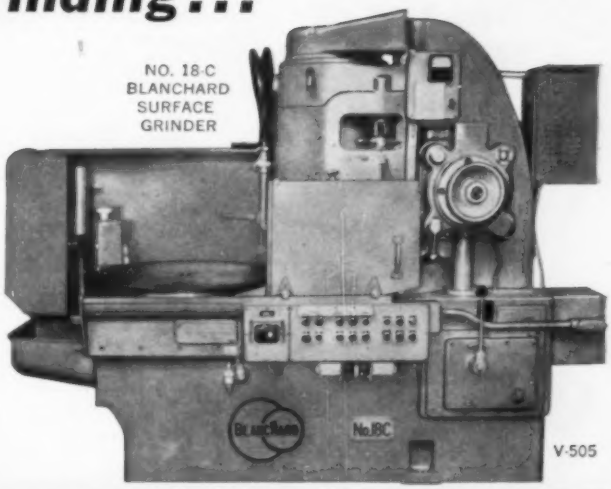
For better, easier grinding...

Whether you're "hogging" off stock from rough castings or precision grinding to a tolerance of ±.0005", you can do it better and easier with the Blanchard No. 18-C Surface Grinder. Once the work is set up, the automatic cycle handles every operation from start to finish. The operator is free to prepare the next load of work or to operate a second No. 18-C Grinder.



Cast Iron Plate. Blanchard ground at the rate of 30 pieces – 60 surfaces – per hour. Stock removal ⅛" each side.

Steel Bars. Blanchard ground at the rate of 48 pieces – 192 surfaces – per hour. Stock .040"-.045" from each side. Limits ±.001" square, flat and parallel.

Hot Rolled Steel Cams. One operator and one No. 18-C Blanchard produce 225 pieces – 450 surfaces – per hour. Stock removal 1/32" each side. Limits ±.001".

just push a button...

- Automatic size control to ±.0005"
- Duplication of repetitive loads
- Pre-set "spark out" time for flatness and surface finish
- No more "operator worry" on close work – greatly reduced fatigue
- A large part of operator's time available for
  - (a) Handling or slushing work pieces
  - (b) Filing burrs
  - (c) Selecting correct wheel and preparing for next job
- Specially-designed sizing device with built-in feature to compensate – automatically – for wheel wear during grinding cycle.

All of these features give you *more efficiency at reduced costs!*

PUT IT ON THE BLANCHARD

Send for your free copy of Model 18-C folder.

THE BLANCHARD MACHINE COMPANY

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Commander TAPPER

★ Wider Range...1 Tapper Handles #0 to 3/4" Taps

★ Automatic Tap Protection

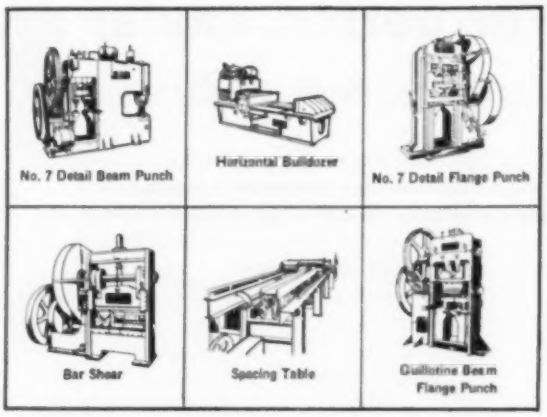
★ Furnished to fit any Drill Press

Commander—"The Tapper That Thinks For Its Operator," has the adjustable full range torque control that instantly stops any tap when it becomes dull, loaded, strikes a hard spot or bottoms in blind hole tapping. Assures maximum tap protection, higher production, even with inexperienced operators.

Your nearby Commander Distributor can give you a demonstration in your own plant. Write for his name and a copy of the NEW Commander Full Line Catalog #851

COMMANDER MFG. CO.
4238 W. Kinzie St. Chicago 24, Ill.

Product of Commander... Builder of Production Tools



MACHINES FOR FASTER METAL-WORKING

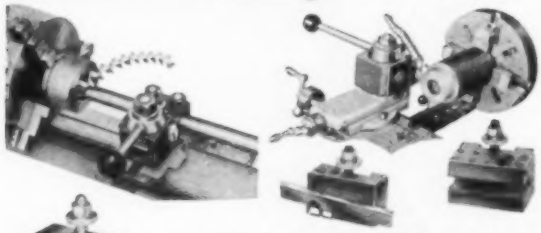
If metal-working is your line, get a line on Beatty machines for fast, accurate, economical metal-working. Beatty equipment requires minimum floor space; features rapid production and return speeds. Built-in stamina plus a keen edge of engineering design make them top performers in any shop.

Write For Full Details

BEATTY MACHINE & MFG. CO.
948 150th Street, Hammond, Ind.

YOUR LATHES "TURN OUT" BIGGER PROFITS

WITH ALORIS QUICK CHANGE TOOL POSTS & TOOL HOLDERS



Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

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- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
- Greater Rigidity
- Leading Lathe Mfrs. Recommend It
- Sizes to Fit Every Lathe
- Unconditionally Guaranteed

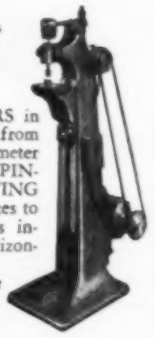
NEW! Aloris Holder for Carbide Triangular Inserts.

Greater rigidity, versatility, efficiency & economy

See Us at Booth 2045 A.S.T.E. Tool Show
Write for Catalog and Price List

ALORIS TOOL CO., INC. 419 Getty Avenue Clifton, New Jersey

GRANT



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Write for literature and don't forget to send samples.

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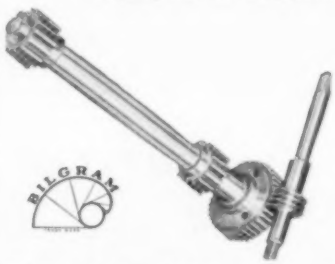

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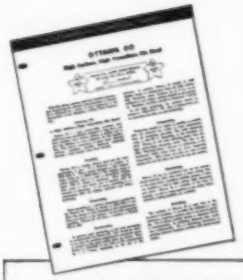
BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

These OTTAWA 60 DIES PAYOFF BIG IN 3 WAYS

★ **Buffing Time Reduced ½**

★ **Rejects Reduced 20%**

★ **Stoning and Regrinding of Dies Reduced 75%**



Write for BLUE SHEET on OTTAWA 60

This concise four-page folder gives all needed handling and shop treatment details on Ottawa 60. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. AM-6

WSW 8840

One way to increase profits is to reduce finishing costs. That's what a fabricator of hearing aid cases accomplished when he switched from regular die steel to A-L's air hardening Ottawa 60 high carbon-high vanadium grade.

Ottawa 60 dies produced stainless steel cases which were free from galling and scoring—were nearly perfect as they came out of the dies. Less than half the previous buffing time was needed to bring them to the required high finish. Rejects—which ran about 20 percent before the use of Ottawa 60—were reduced almost to the point of elimination. Also, the new Ottawa 60 dies required stoning and regrinding only a quarter as often as the standard tool steel dies they replaced.

This same manufacturer has passed along significant savings to other customers through the use of Ottawa 60. By practically eliminating rejects due to corner cracking and scoring, customers receive better stamped parts at lower per-piece cost.

Let us show how you, too, can save with A-L tool steels and, at the same time, furnish your customers a better product.

Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

For nearest representative, consult Yellow Section of your telephone book.

For complete MODERN Tooling, call

Allegheny Ludlum

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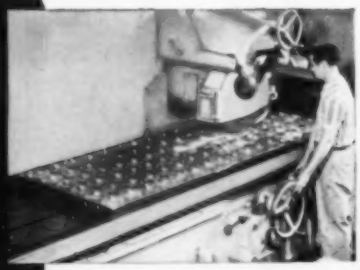
FINE TOOL STEELS SINCE 1854

For Holding

SMALL

MEDIUM or

LARGE PARTS

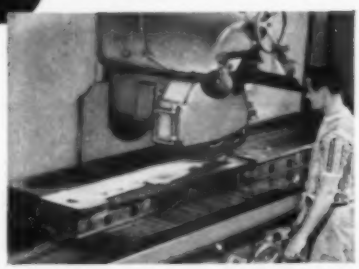


Grinding a load of 102 gears.

Use Sundstrand Magnetic Chucks

Here's another interesting application of magnetic holding applied to a surface grinder. The deep penetrating power of the Sundstrand magnetic chucks makes it possible to hold a great number of small parts or large castings. In all cases setup is simplified and clamping time is greatly reduced.

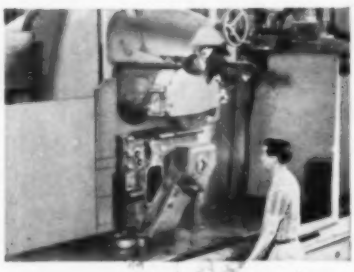
Whether you have tool room, production, or special holding problems, look into the possibilities of eliminating expensive clamping and increasing production with Sundstrand Magnetic Chucks.



Grinding four slide castings.

Get All the Facts

Write for complete information on these time saving magnetic chucks. Ask for bulletin 192M.



Grinding drill press frame

SUNDSTRAND

POWER-GRIP

SUNDSTRAND MACHINE TOOL CO.

Magnetic Products Division

2531 ELEVENTH ST., ROCKFORD, ILLINOIS

The NEW AMERICAN MACHINIST'S HANDBOOK

Edited by RUPERT LE GRAND

Senior Associate Editor, *American Machinist*

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1579 pp. 3½ x 8, 774 illus., $11.00

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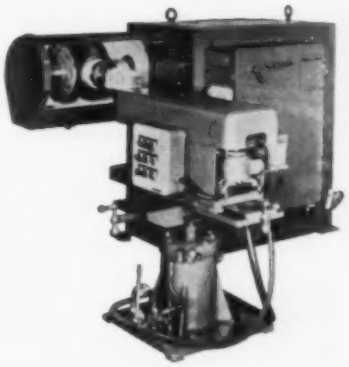

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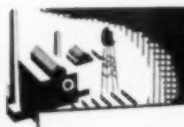

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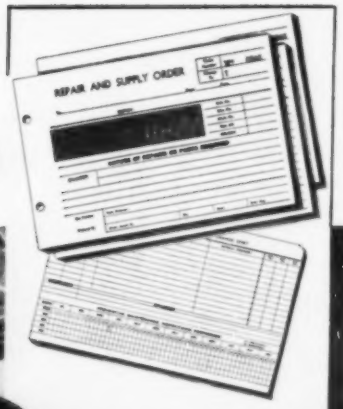
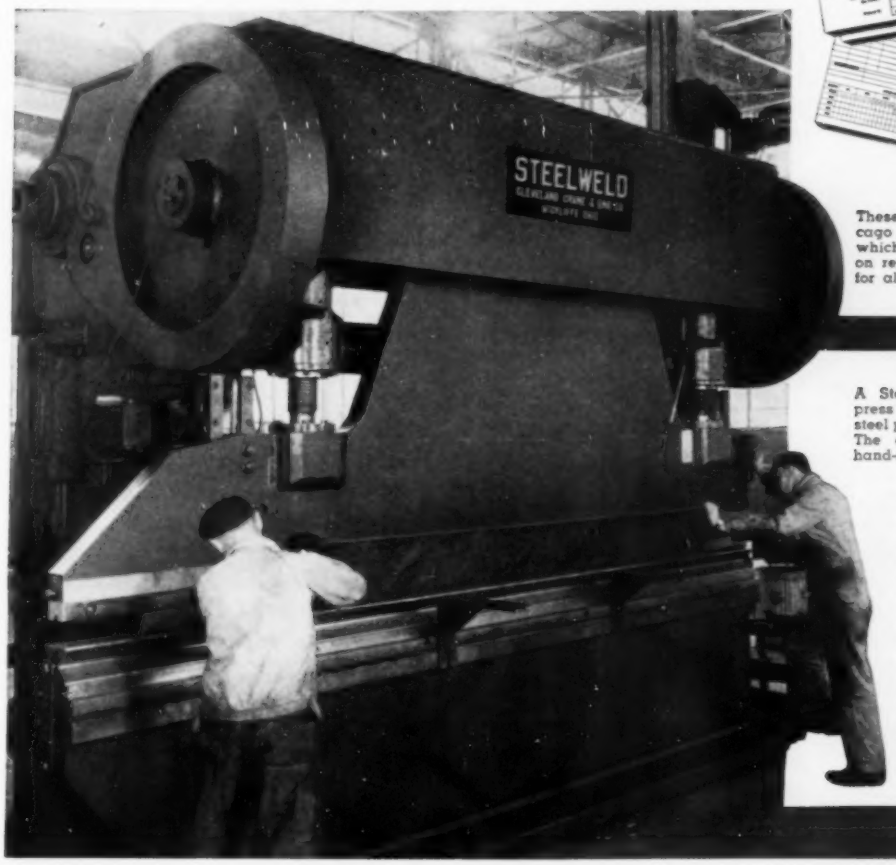


These forms enable the Chicago Plant to develop records which provide concrete facts on repairs and maintenance for all machines.



A Steelweld Model J4½-10 press working on various size steel plates up to 16'-0" x ¼". The ease with which the hand-cranked back gauge is adjusted is a favorable feature. The press is easily jogged in minute amounts. Shown is a 14'-0" x ¼" plate being formed for a hopper.

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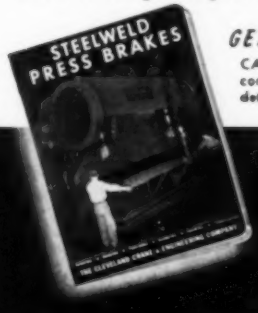

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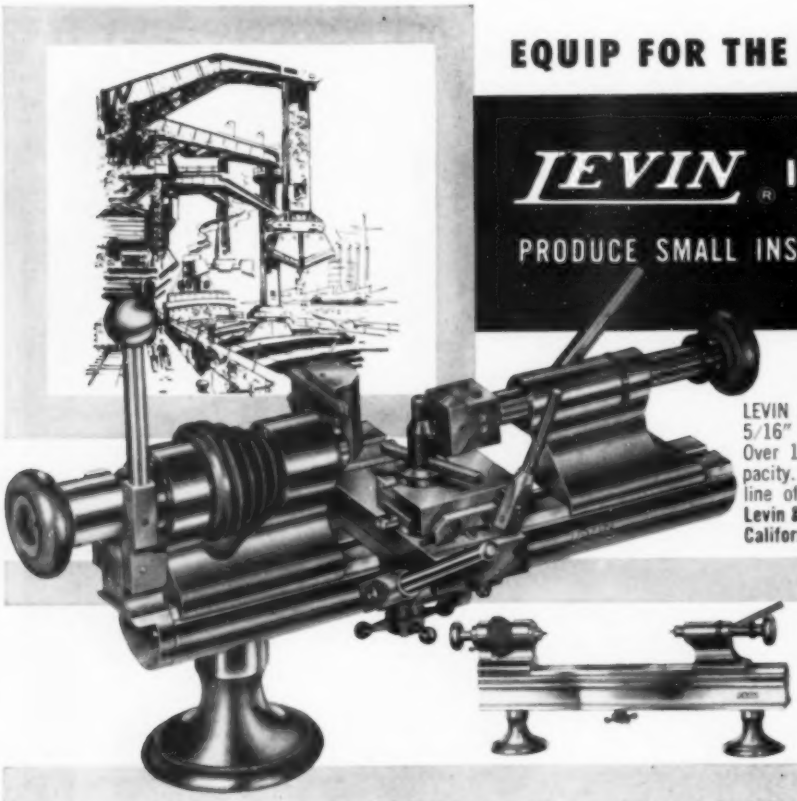

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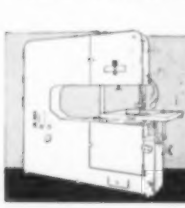

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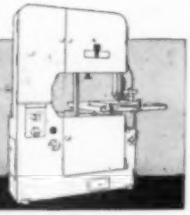

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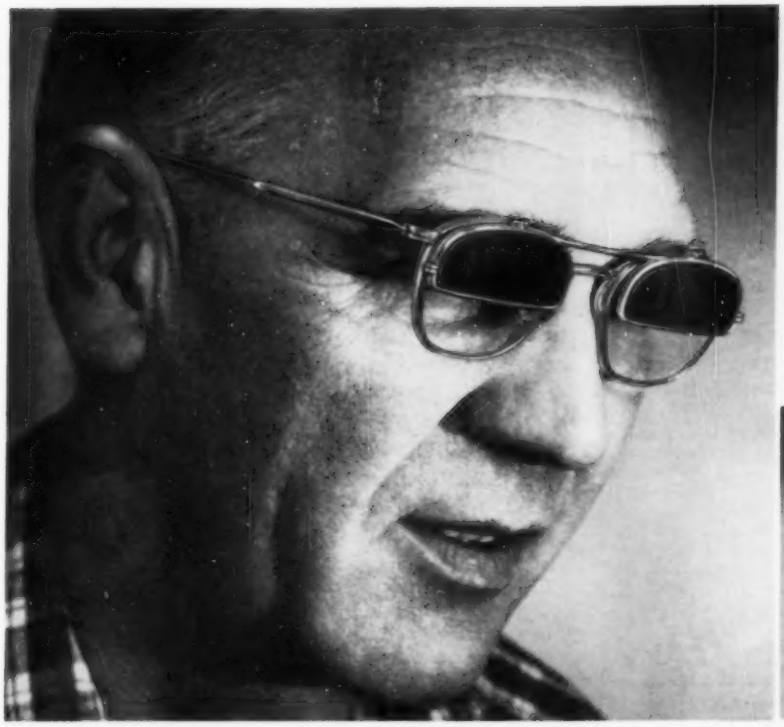

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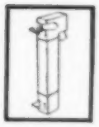
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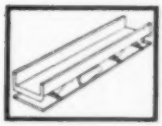
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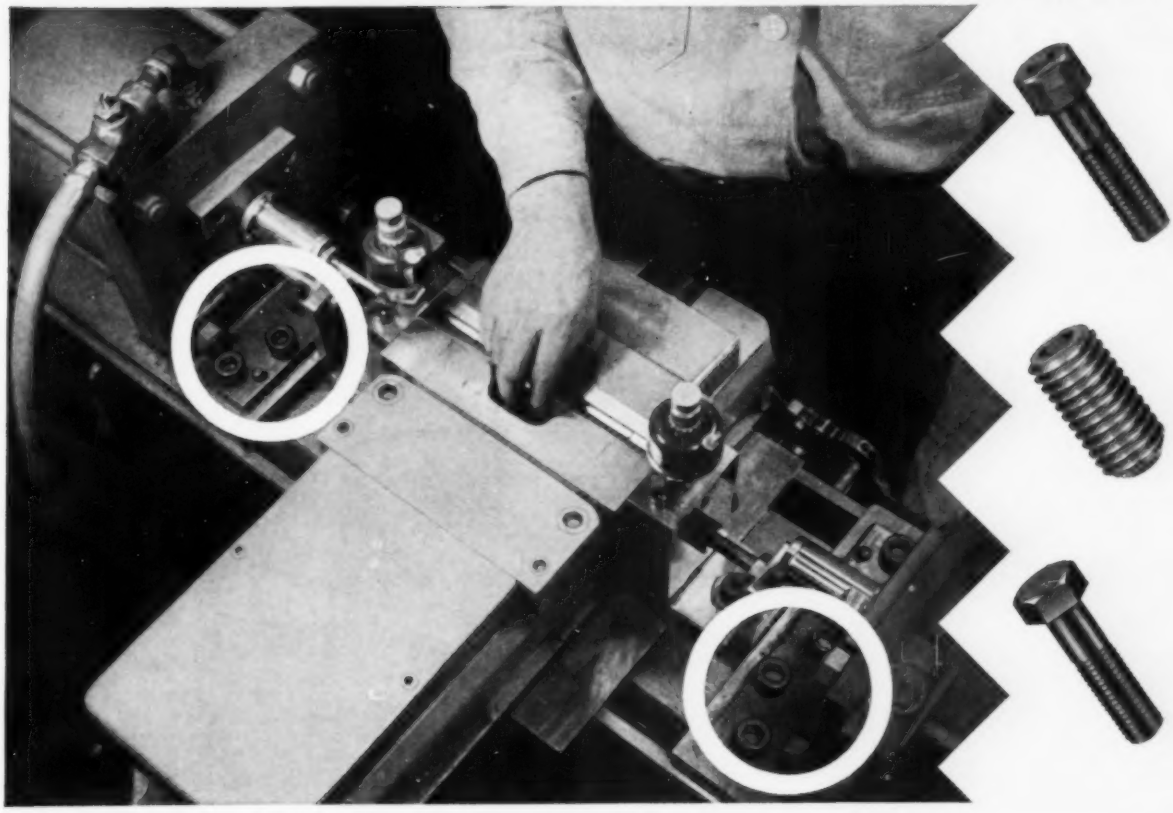

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GEAR SHAPER. 7125A Fellows, 1942
GEAR SHAVER. GCC Red Ring, 8", late
GRINDER. UNIV. 14"x14" Rivett Model 112, 1942
GRINDER. PLAIN. 20"x72" Landis, 1943
GRINDER. DISC. 30" No. 84A Gardner opposed, 1947
GRINDERS. INT. 72A5 Heald Univ. 1943
GRINDERS. SURF. 36" No. 18 Blanchard, 1940
GRINDER. CARBIDE. Nos. 48 and 49 Excello, late
LATHE. 126" x 96 ft. Niles Bement Pond.
LATHES. 11" and 14½" South Bend, late
LATHE. TURRET. No. 5 Gisholt, 1940
MILL. No. 33 Sundstrand auto. "Fluidscrew", 1943
MILL. No. 2 Brown & Sharpe vert., 1943
OIL GROOVER. Wicaco continuous, 1953.
SAW. 10" x 10" Racine "Shearcut", hack, 1941
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No. 1S-25 Acme Saddle Type, m.d.
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No. 2 Bardons & Oliver Ram Type Electric, m.d.
No. 2L Gisholt, 1943
No. 2A Warner & Swasey, 1946
No. 2HB Libby, 1942
No. 3 Gisholt, m.d., 1945
No. 3A Warner & Swasey, m.d.
No. 3 Bardons & Oliver Ram Type, flanged m.d.
No. 3L Gisholt, m.d., 1943
No. 3AL Gisholt, with cross sliding turret, 1940
No. 4 Midland Universal Ram Type, m.d.
No. 4 Warner & Swasey Universal Ram Type, m.d.
No. 4 Gisholt, 1943
No. 4A Warner & Swasey Universal Hollow Hexagon, m.d.
No. 4A Warner & Swasey Universal, m.d., chucking, 1939
No. 4L Gisholt Universal, m.d.
No. 4FU Foster Fastermatic, m.d., latest, 1945
No. 4R Libby Ram Type, m.d. in base
No. 5 Midland, m.d.
No. 5 Gisholt Ram Type, m.d.
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6.2 Denver Acme Ram Type Universal, m.d., 1944
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INDEX TO ADVERTISERS

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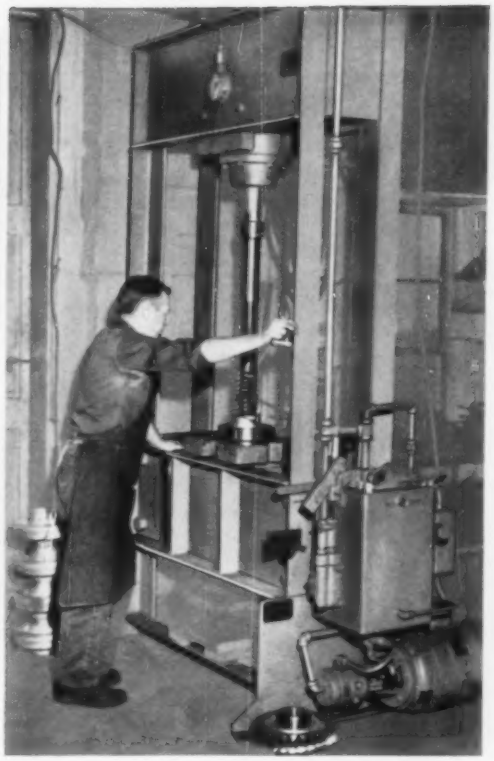
	Page
Accurate Bushing Company	150
Ace Drill Corporation	178
Allegheny Ludlum Steel Corp.	161
Aloris Tool Company	160
American Chain & Cable Co. Inc., Wilson Mechanical Instrument Div.	156
American Optical Co.	167
American Sip Corporation	50
American Tool Works Co.	35
Ames Company, B. C.	177
Anderson Corporation	148
Armstrong Blum Mfg. Co.	56
Armstrong Brothers Tool Company	46
Avey Division of Motch & Merryweather Co.	30-31
Barnes Drill Company Insert Facing	120C
Beatty Machine & Mfg. Co.	160
Bethlehem Steel Company	110
Bilgram Gear & Machine Company	160
Blanchard Machine Co.	159
Bliss Co., E. W.	179
Brown & Sharpe Mfg. Co.	47, 61
Buffalo Forge Co.	44-45
Buhr Machine Tool Co. Insert Bet.	64-65
Bullard Company	68
Burg Tool Mfg. Company Inc.	40-41
Cincinnati Gilbert Machine Tool Co.	121
Cincinnati Grinders Incorporated	16-17
Cincinnati Lathe & Tool Co.	55
Cincinnati Milling Machine Co.	4-5
Cincinnati Shaper Company	82
Cities Service Oil Co.	143
Cleveland Automatic Machine Co.	51

(Continued on page 176)

Case History No. 14

Licking View Tool & Machine Co.

This close-up view shows spline broaching of a gear for coal loading equipment as performed at Licking View Tool & Machine Co. on KRW Press 37K-MD3-SP.



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Ram Stroke — in.	12
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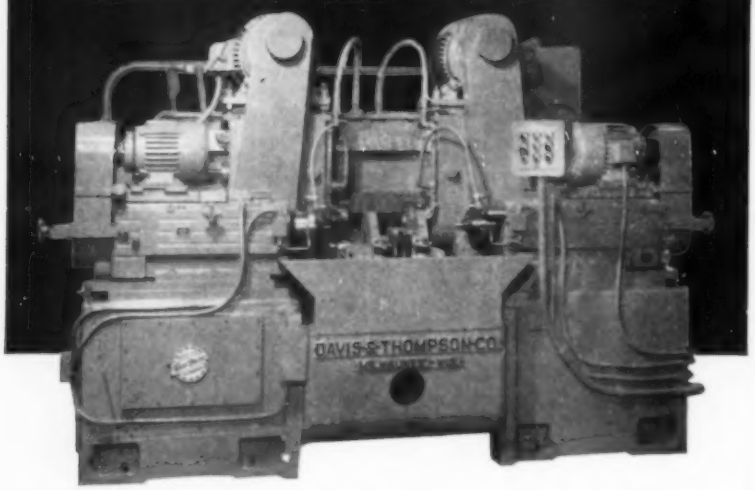

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INDEX TO ADVERTISERS

(Continued from page 175)

	Page
Cleveland Crane & Engineering Co.	165
Columbus Die-Tool & Machine Co.	142
Commander Manufacturing Co.	160
Cross Company	28-29
Davis & Thompson Co.	176
Delta Power Tool Division, Rockwell Mfg. Co.	79
Devcon Corporation	152
DoAll Company	26-27
Dodge Mfg. Corporation	157
du Mont Corporation	58
Eastman Kodak Co. Industrial X-Ray	153
Economy Engineering Co.	152
Errington Mechanical Laboratory	158
Ex-Cell-O Corporation	66
Exolon Co.	136
Fellows Gear Shaper Company	6-7
Firth Sterling Inc.	106
Foote-Burt Company	105
Gardner Machine Company	21
Geometric-Horton Insert Facing	33
G & L Hypro Division Giddings & Lewis Machine Tool Co.	14-15
Gisholt Machine Company	32
Gleason Works	3
Goss & deLeeuw Machine Company	140
Grant Mfg. & Machine Company	160
Greenfield Tap & Die Corp. Insert Facing	32
Greenlee Brothers & Co.	70
Hardinge Brothers, Inc.	49
Hartford Special Machinery Co.	154
Haynes Stellite Co., Div. Union Carbide Corp.	42-43
Heald Machine Company, Sub. Cincinnati Milling Machine Co.	2nd Cover

INDEX TO ADVERTISERS

	Page
Inland Steel Company	80
Jones & Lamson Machine Company	123, 125, 127, 129
Kingsbury Machine Tool Corp.	137
Ladish Company	Insert Facing 120
Laminated Shim Co., Inc., Shim Div.	60
Landis Machine Company	10-11
Landis Tool Company	12-13
Leland-Gifford Company	59
Levin & Son Inc., Louis	166
Linley Brothers Co.	152
Lodge & Shipley Company	72
Lovejoy Tool Co. Inc.	138
Ludwigsburger Maschinenbau GMBH	145
M.B.I. Export & Import Ltd.	164
McGraw-Hill Book Co. Inc.	164
Minster Machine Co.	33
Modern Machine Tool Company	168
Moline Tool Company	179
Moore Special Tool Co., Inc.	64
Morris Co., Robert E.	180
Morse Twist Drill & Machine Co.	8-9
National Automatic Tool Co., Inc.	38-39
National Broach & Machine Co.	149
Nelco Tool Co. Inc.	61
Norton Company	18-19
Olofsson Corporation	135
Opto-Metric Tools Inc.	168
Orban Co. Inc., Kurt	131
Osborn Mfg. Co.	163
Perkins Machine Company	134
Pipe Machinery Company	133
Porter, Inc., H. K.	150
Prab Conveyors, Inc.	168
Producto Machine Co.	57

(*Continued on page* 178)

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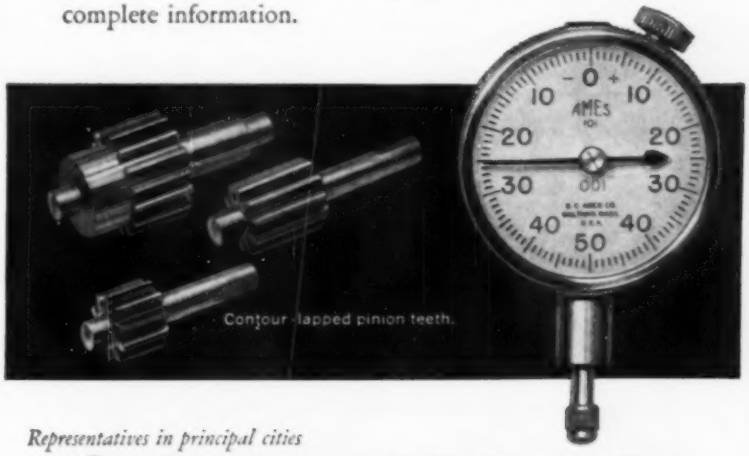

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INDEX TO ADVERTISERS

(*Continued from page 177*)

	Page
Randall Co., Inc., Frank E.	150
Republic Steel Corp.	36-37
Rockford Machine Tool Company	24-25
Rodgers Hydraulic Inc.	146
Rotor Tool Company	48
Russell Burdsall & Ward Bolt & Nut Company	155
Ryerson & Son Inc., Joseph T.	74
Scott Paper Company	141
Sheffield Corp. of Bendix Aviation	34
Sidney Machine Tool Co.	Insert Bet. 64-65
Smith Corporation, A. O.	52-53
Snyder Tool & Engineering Co.	3rd Cover
Standard Oil Co. (Indiana)	62-63
Standard Screw Company	169
Steelweld Machinery Division, Cleveland Crane & Engineering Company	165
Sundstrand Magnetic Products Co.	162

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ADVERTISING SALES STAFF

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INDEX TO ADVERTISERS

	Page
Tannewitz Works	166
Threadwell Tap & Die Corp.	54
Timken Roller Bearing Company, Steel & Tube Div.	4th Cover
Union Carbide Corporation, Haynes Stellite Div.	42-43
United Shoe Mchry. Corporation	144
U. S. Tool Co. Inc.	20
Vanadium-Alloys Steel Co.	151
Vickers, Incorporated Div. of Sperry-Rand Corporation	112
Vlier Engineering Corp., Sub. Barry Controls Inc.	108
Waldes Koh-I-Noor Inc.	139
Warner & Swasey Company	22-23
Weldon Tool Company	76
Wiedemann Machine Co.	132
Wilson, Inc., K. R.	175
Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc.	156
Wolverine Tool Co.	168

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 171

EQUIPMENT
(Used or Surplus New)
For Sale 171-173

ADVERTISERS INDEX

Adelphia Equipment Co. 171
Cincinnati Machinery Co. 172
Eastern Machinery Co., The 172
Ehrhardt Tool & Machine Co. 171
Falk Mill Supply Co., Inc. 171
Hyman & Sons, Joseph 172
Land Machinery Co., Inc. 171
Machine Tool Exchange 172
Miles Machinery Co. 171
Republic Aviation—(Ketson) 171
Sal Metal Products Co. 172
Tait Manufacturing Co. 172

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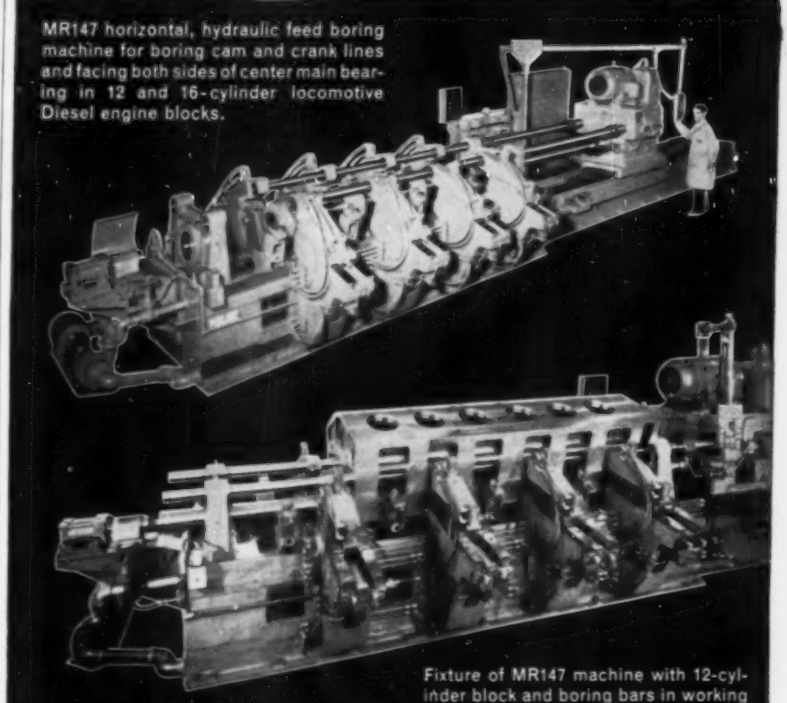
MR147 horizontal, hydraulic feed boring machine for boring cam and crank lines and facing both sides of center main bearing in 12 and 16-cylinder locomotive Diesel engine blocks.



Fixture of MR147 machine with 12-cylinder block and boring bars in working position. Cam bars run in hydraulic powered bushings which are retracted when loading fixture.

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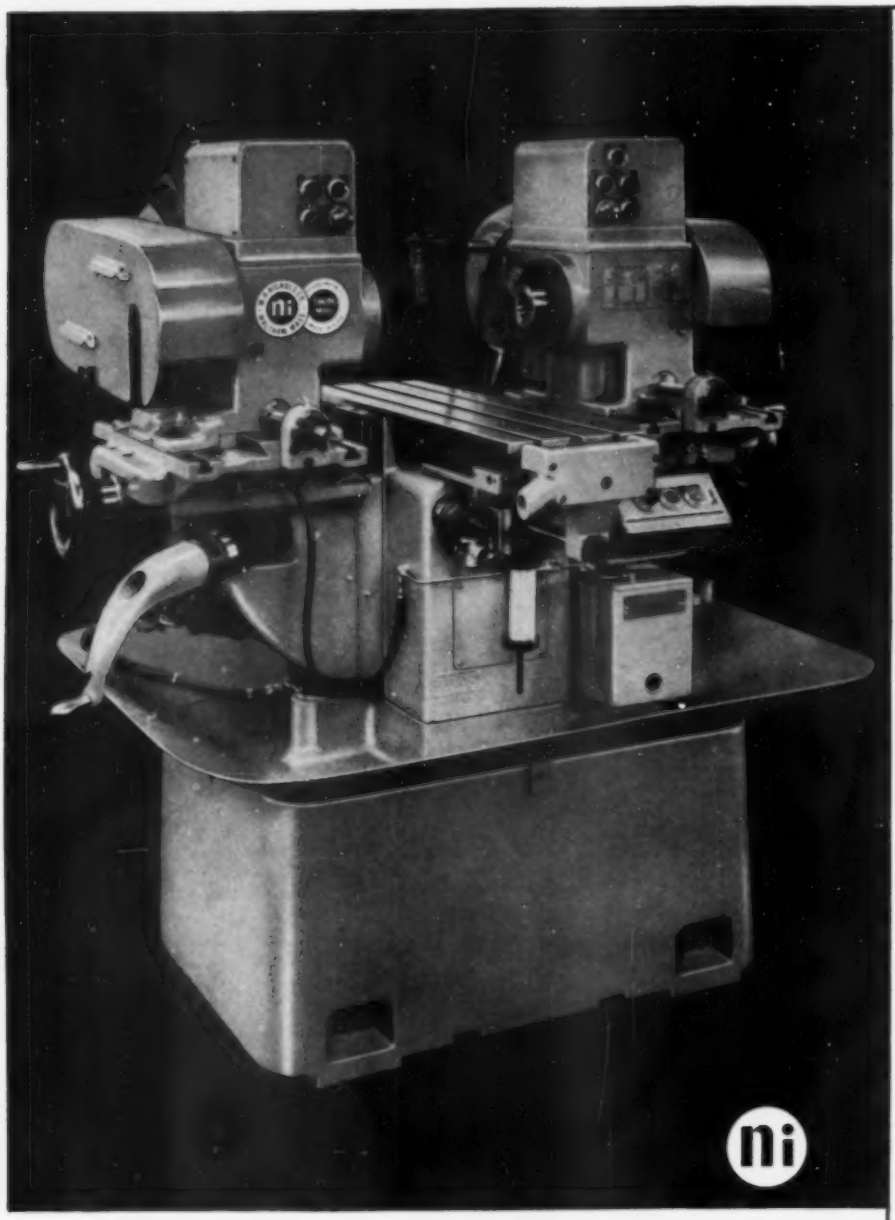
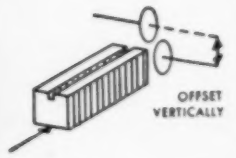
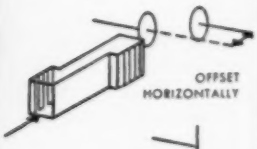
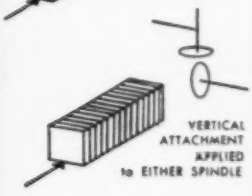
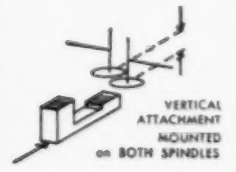


ALL THESE OPERATIONS









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